VPPC 2020
Conference
Final Program

THE 17TH IEEE VEHICLE POWER AND PROPULSION CONFERENCE

-CONNECTING GREEN E-MOTION-

Virtual Conference | 18 November to 16 December, 2020

IEEE VTS Connecting the Mobile World

VPPC 2020

VPPC 2020
Connecting Green e-Motion

18 NOVEMBER TO 16 DECEMBER, 2020 | GIJÓN, SPAIN

THE 17TH IEEE VEHICLE POWER AND PROPULSION CONFERENCE

-CONNECTING GREEN E-MOTION-

Virtual Conference | 18 November to 16 December, 2020

WE WANT TO THANK OUR SPONSORS FOR THEIR SUPPORT

CÁTEDRA GIJÓN SMART CITIES

Ayuntamiento de Gijón

Gijón Convention Bureau

mg.lab

Gijón

IEEE

Universidad de Oviedo

SBC IEEE

IEEE VTS Mobile World Spanish Chapter

Cátedra Milla del Conocimiento: Gijón Smart Cities
Cátedra Milla de la Conocencia: Xixón Smart Cities
Mile of Knowledge Chair: Gijón Smart Cities

Universidad de Oviedo ~ *Universidá d'Uviéu ~ University of Oviedo*

Pablo Arboleya
University of Oviedo, Spain

Feng Jianghua
CRRC Zhuzhou Institute Co. Ltd., China

Welcome from the conference General Chairs

On behalf of the Organizing Committee, it is our great pleasure to welcome you to the 17th IEEE Vehicle Power and Propulsion Conference. Our goal is to maintain the high scientific level of previous events and provide researchers in the field of electric mobility with a forum to discuss new ideas, and foster new alliances between researchers and also between academic institutions and industry.

Unfortunately, the current circumstances arising from the spread of the COVID'19 virus have forced us to organize this event virtually in order to guarantee the safety of all those attending. A face-to-face event would have put the safety of the participants at risk and would have posed practically unbearable logistical challenges. From the organizing committee we are fully aware that this situation is not optimal and we would have liked to be able to hold the conference as planned. However, we have put all our effort into organizing the virtual event in the best possible way with the restrictions imposed that are not part of our decisions. Having said this, we are convinced that the experience will be enriching for all participants. In this edition we have 6 keynote speakers of the highest level who will present very interesting and relevant topics in the field of the transportation electrification and decarbonization. In addition, 4 tutorials will be offered completely free of charge to all attendees and will be available on demand on the conference platform. The offer will also be completed with a workshop on Virtual product development and production of all types of electrified vehicles and components in which the experiences of 4 H2020 projects will be presented. The second edition of the IEEE VTS workshop on electrical railway systems will also be held and we hope that we can also consolidate this workshop for future VPPC editions. The programme is completed with another successful edition of IEEE VTS Motor Vehicles Challenges in addition to the traditional regular tracks and a very diverse and complete list of special sessions.

We would not dare to carry out such an event, that became the flagship conference for advanced transportation without the support of an enthusiastic local committee that together with the international collaborators, the technical program committee and the VPPC steering committee, made a huge effort to guarantee the highest organizational and scientific quality. In each edition of this conference it is necessary to thank all the participants and to recognize the effort and dedication invested in the organization of the conference. This year, this recognition becomes even more necessary due to the special circumstances in which the event has had to be organized and which have forced numerous changes derived from the existing uncertainty and the constant need to adapt to changing guidelines on the part of the different authorities. That is why I would like to end by thanking authors, reviewers, organizational and technical committees, regular track chairs, special session organizers, keynote speakers, tutorial instructors, the VPP TechCom, local committee members, volunteers and many others. Special recognition is addressed to VPPC steering committee Chair Alain Bouscayrol, TPC Chairs Giambattista Gruosso, Jorge García and Ricardo de Castro and our tireless VTS support Rodney (Clint) Keele and Cerry J. Leffler Cerry. Many thanks to those who contributed to this VPPC edition, including local committee members and volunteers.

We hope that the conference will meet expectations this year and we hope that since you will not be able to enjoy your physical stay in Gijón this year, you will be able to do so and visit us at the next edition of IEEE VPPC'2021 which will be held, this time in an on-site format, in the city of Gijon, Spain.

Pablo Arboleya (VPPC 2020 General Chair)

Feng Jianghua (VPPC 2020 General Co-Chair)

Message from the Technical Program Committee Chairs

Giambattista Gruosso
Politecnico di Milano
Italy

Ricardo De Castro,
DLR German Aerospace Center,
Germany

Jorge Garcia,
University of Oviedo,
Spain

The Technical Program Committee (TPC) is pleased to welcome all of you to the 17th IEEE Vehicle Power and Propulsion Conference (IEEE VPPC) in Gijon for the first time proposed as virtual event due to the recent covid-19 pandemic.

To highlight the state-of-art technical achievement and strengthen the current research trends, the TPC committee, with the help of all track chairs, has put forward a notable program. During this IEEE VPPC edition, we organized: (i) 7 Regular Tracks covering many exciting aspects of vehicle power and propulsion (ii) 6 Special Sessions and (iii) a Recent Result Track. In addition, 4 Technical Tutorials are also part of the conference program. Not all these organization achievements would be feasible without the valuable collaboration of the track chairs (including Special Session Track chairs).

The technical program is designed in order to address new, more advanced and interesting point of view on the challenges of a sustainable mobility. Hence the presentations will be online and are included into the program. All the accepted full papers will be fully published in the conference proceedings. In addition, the program offers outstanding keynotes, presented by renowned experts in electric and connected mobility.

The design of this program would not be possible without the voluntary and constant support from outstanding colleagues that we would like to thank warmly. Many thanks to the TPC members that organized an effective review process with their professional and timely review or technical contributions. We would also like to thank the invited speakers, Special Session and Tutorial Chairs for organizing excellent sessions that will contribute with their latest insights to the conference attendees.

Finally, making a successful technical program is not possible without the contributions of authors, to whom we would like to express our gratitude for having decided to present and share their ideas and works to our community.

We would also like to thank the IEEE VPPC 2020 Organization and VPP TechCom for its full support.

We look forward to meeting you virtually in Gjion, Spain, from October 14th to October 17th.

TPC Chairs of IEEE VPPC 2020

Giambattista Gruosso
Politecnico di Milano
Italy

Ricardo De Castro,
DLR German Aerospace Center,
Germany

Jorge Garcia,
University of Oviedo,
Spain

Prof. Alain Bouscayrol,
University of Lille, France

Welcome from the chair of the VPPC steering committee

On behalf of the Vehicle Power Propulsion Conference (VPPC) steering committee, it is my great pleasure to welcome you to the 17th IEEE VPPC.

First, I would like to share our new organization. The VPP (Vehicle Power Propulsion) TechCom (Technical Committee) of IEEE VTS has been split in two committees. The **IEEE VPPC steering committee** is in charge of the selection of the VPPC locations, the validation of the Technical Program Committee, and scientific & logistic advices for maintaining the conference at the highest level. It is composed of previous general chairs of the conference. The **VPP TechCom** is in charge of other VPP activities within IEEE VTS such as paper awards, organization of special issues in international journals, organization of scientific workshops, etc. This change has enable to open the VPP TechCom to new members strongly involved in VPPC. Daniel Hissel (University of France Comté, France) as chair and Giambattista Gruosso (Politecnico di Milano, Italy) as co-chair have been elected for the next 2 years. Congratulations Daniel and Giambattista!

Second, IEEE-VPPC'19 has been particularly difficult to organize in the context of the COVD-19. After many discussions at the different levels, a virtual event has been decided to ensure the scientific dissemination while preserving safety and health of attendees. The VPPC steering committee has proposed that **IEEE-VPPC'20 will be organized in Gijon in October 2021** to consider the huge work of the actual organization team. This proposal has been validated by IEEE-VTS to propose an in-presence event in the city of Gijon next year.

Special thanks to Prof. Abbas Jamalipour, VTS President, and Prof. J.R. Cruz, the VTS Conference chair, for their strong supports. Warms thanks to Cerry Leffler and Rodney Clint Keele (VTS Program Administrators) for their huge work in this difficult context. Kind thanks to Prof. Pablo Arboleya (University of Oviedo, Spain), VPPC'20 general chair, for his great effort to organize high-level event despite the context. Many thanks to Giambattista Gruosso (Politecnico di Milano, Italy), Ricardo de Castro (DLR, Germany) and Jorge Garcia (University of Oviedo, Spain), the Technical Program Committee co-chairs for their hard work to keep a high-level scientific program. **A key international conference needs a strong and dynamical international team** that can propose relevant adaptations in any context. We are lucky to have such a strong and dynamical team!

I hope you will enjoy the virtual VPPC'20, and I am looking forward to meeting you in-presence in Gijon in 2021!

Prof. Alain Bouscayrol
Chair of the VPPC steering committee

Organizing Committee

VPPC 2020 General Co-chairs
Pablo Arboleya, Universidad de Oviedo, Spain
Jianghua Feng, CRRC, China

Honorary Chair
Ouyang Minggao, Tsinghua University, China

Technical Program Co-chairs
Giambattista Gruosso, Politecnico di Milano, Italy
Ricardo De Castro, DLR German Aerospace Center, Germany
Jorge Garcia, University of Oviedo, Spain

Special Sessions Co-chairs
Paulo Pereirinha, Polytechnic of Coimbra and INESC Coimbra, Portugal
Jose Manuel Cano, University of Oviedo, Spain
Manuel Arias Pérez de Azpeitia, University of Oviedo, Spain

Tutorials Co-chairs
Cristian Blanco Charro, University of Oviedo, Spain
Antonio Javier Calleja, University of Oviedo, Spain
Bassam Mohamed, University of Oviedo, Spain

Local Organizing Chair
Jorge Garcia, University of Oviedo, Spain

Finance Chair
J. R. Cruz, The University of Oklahoma, USA

Awards Co-chairs
Minh Ta Cao, Hanoi University, Vietnam
Javier Solano, Universidad de Santander, Columbia

Publicity Co-chairs
Diego Lamar, University of Oviedo, Spain
Zhongbei Tian, University of Birmingham, UK
Jon Ander Lopez, IKERLAN, Spain

Organizing Committee—Continued

Sponsors Chair
Jorge Garcia, University of Oviedo, Spain

Publications Co-chairs
Rodney Clint Keele, University of Oklahoma, USA
Ramy Georgious, University of Oviedo, Spain
Angel Navarro, University of Oviedo, Spain

Webmasters
Cerry Leffler, University of Oklahoma, USA
Islam El-Sayed, University of Oviedo, Spain
Xavier Dominguez, University of Oviedo, Spain

Conference Administrators
Rodney Clint Keele, University of Oklahoma, USA
Cerry Leffler, University of Oklahoma, USA

Technical Program Committee

TPC Chairs

Giambattista Gruosso, Politecnico di Milano, Italy

Ricardo De Castro, DLR German Aerospace Center, Germany

Jorge Garcia, University of Oviedo, Spain

Track Chairs

Track 1 – Energy Storage and Generation, Components and Systems

Ali Sari (Lead), University of Lyon, France
Manuela González Vega, University of Oviedo, Spain
Du Jiuyu, Tsinghua University, China

Track 2 – Power Electronics Motor Drives and Electric Power Systems

Nadir Idir (Lead), Université de Lille, France
Jian-Xin Shen, Zhejiang University, China
Jesús Doval, University of Vigo, Spain

Track 3 – Vehicular Electronics and Intelligent Transportation Systems

Sergio Saporana (Lead), University of Pisa, Italy
Sousso Kelouwani, University of Quebec at Trios-Rivières, Canada
Juan Diaz González, University of Oviedo, Spain

Track 4 – Control and Energy Management of Transportation Systems

Theo Hofman (Lead), Eindhoven University of Technology, Netherlands
Herschel C. Pangborn, Pennsylvania State University, USA
Jon Ander López, IKERLAN, Spain

Track 5 – Modeling, Analysis and Simulation of Transportation Systems

Joao Trovao (Lead), University of Sherbrooke, Canada
Sylvain Pagerit, Argonne National Laboratory, USA
Pablo Garcia Fernández, University of Oviedo, Spain

Track 6 – Charging Systems and Infrastructures

Rui Araújo (Lead), University of Porto, Portugal
Duy-Dinh Nguyen, Aichi Institute of Technology, Japan
Jose Antonio Aguado, University of Malaga, Spain

Track 7 – Hydrogen Refueling Infrastructures and Fuel Cell Vehicles

Daniel Hissel (Lead), Université de Franche-Comté, France
Loic Boulon, University of Quebec at Trios-Rivières, Canada
Andrés Barrado Bautista, Universidad Carlos III, Spain

Recent Results Track

Giancarlo Storti Gajani, Politecnico di Milano, Italy
Xiaosong Hu, Chongqing University, China
Eduardo Pilo, Universidad Fransciso de Vitoria, Spain

Technical Program Committee—Continued

Special Session Chairs

Paulo Pereirinha, Polytechnic of Coimbra and INESC Coimbra, Portugal

Jose Manuel Cano, University of Oviedo, Spain
Manuel Arias Pérez de Azpeitia, University of Oviedo, Spain

SS1 – IEEE VTS Workshop on Electrical Railway Systems
Co-chair: Zedong Zheng, Tsinghua University, China

Co-chair: Zhongbei Tian, University of Birmingham, UK

SS2 – IEEE VPPC Electric and Hybrid Buses Level 1: Components Level
Co-chair: Paulo G. Pereirinha, Polytechnic of Coimbra and INESC Coimbra, Portugal

Co-chair: Feng Wang, Xi'an Jiaotong University, China

SS3 – IEEE VPPC Electric and Hybrid Buses Level II: Systems Level
Co-chair: Andoni Saez de Ibarra, IKERLAN Technology Research Center, Spain

Co-chair: Mikko Pihlatie, VTT Technology Research Center, Finland

SS4 – EMR and Other Graphical Descriptions
Co-chair: Clément Mayet, Le CNAM-SATIE, France

Co-chair: Minh C. TA, Hanoi University of Science and Technology, Vietnam

SS5 – IEEE VTS Motor Vehicles Challenge 2020 – Energy Management of a Fuel Cell / Ultracapacitor / Battery HEV
Co-chair: Javier Solano, Universidad Industrial de Santander, Colombia

Co-chair: Bao Huy Nguyen, Université de Sherbrooke, Canada

SS6 – IEEE VPPC Application of Wide Bandgap Devices (SiC/GaN) Based Power Electronics Systems for E-mobility
Co-chair: Ke Li, Coventry University, UK

Co-chair: Joao P. Trovao, Université de Sherbrooke, Canada

SS7 – Design and Control of Powertrain Components for Small Urban Electric Vehicles
Co-chair: Davide Tavernini, University of Surrey, United Kingdom

Co-chair: Valentin Ivanov, TU Ilmenau, Germany

SS8 – Multi-level Models for Simulation of Electrified Vehicle
Co-chair: Ronan German, Univ. Lille and MEGEVH Network, France

Co-chair: Calin Husar, Siemens Industry Software, Romania

Technical Program Committee—Continued

SS9 – Innovative Drivetrains for Electrified Vehicles
Co-chair: Walter Lhomme, University of Lille, MEGEVH Network, France
Co-chair: Florian Verbelen, Ghent University, Flanders Make-UGent, Belgium

SS10 – System Modelling, Validation and Testing for Electrified and Automated Vehicles
Co-chair: Barys Shyrokau, TU Delft, Netherlands
Co-chair: Dzmitry Savitski, ARRIVAL Germany GmbH, Germany

SS11 – Economics and Decision-making in the Transition to Electric Vehicles
Co-chair: Eric Hittinger, Univ. of Lille, France
Co-chair: John Helveston, George Washington Univ., United States

VPP Standing Committee

Chair:

Alain Bouscayrol—VPPC'10 chair, Univ. Lille, MEGEVH—France

Members:

Loïc Boulon—VPPC'15 chair, Univ. Québec á Trois-Rivières—Canada

C.C. Chan—VPPC'08 chair, Univ. Hong Kong—Hong Kong

Daniel Hissel—VPPC'17 chair, Univ. Bourgogne Franche Comté, MEGEVH—France

Paulo Pereirinha—VPPC'14 chair, Polyt. Of Coimbra, INESCC—Portugal

Minh Ta Cao—VPPC'19 chair, Hanoi University of Sciences & Technology—Veitnam

Jian-Xin Shen—VPPC'16 chair, Zhejiang University, Hangzou—China

João P. Trovao—VPPC'18 chair, Univ. Sherbrooke—Canada

VPP Technical Committee

Chair

Prof. Alain Bouscayrol – University of Lille1 – France

Members

Pablo Arboleya, University of Oviedo, Spain
Rui Araujo, University of Porto, Portugal
Philippe Barrade, University of Applied Sciences - Sion, Switzerland
Loic Boulon, University of Quebec at Trios-Rivières, Canada
C. C. Chan, University of Hong Kong, China
Yuan Cheng, Harbin Institute of Technology, China
Ricardo De Castro, German Aerospace Centre, Germany
Chrsitophe Espanet, Sonceboz, Switerland
Jorge Garcia, University of Oviedo, Spain
Ronan German, University of Lille, France
Giambattista Gruosso, Politecnico di Milano, Italy
Kimimori Hamada, PD Plus, Japan
Daniel Hissel, Université de Franche-Comté, France
Theo Hofman, Eindhoven University of Technology, Netherlands
Samri Jemai, Université de Franche-Comté, France
Sousso Kelouwani, University of Quebec at Trios-Rivières, Canada
Clement Mayet, CNAM, France
Sylvain Pagerit, Argonne National Labs, USA
Marie-Cecile Pera, Université de Franche-Comté, France
Paulo Pereirinha, Polytechnic of Coimbra and INESC Coimbra, Portugal
Aymeric Rousseau, Argonne National Labs, USA
Mircea Ruba, Technical University of Cluj-Napoca, Romania
Jian-Xin Shen, Zhejiang University, China
Luis Silva, University Rio Cuarto, Argentina
Javier Solano, Universidad Industrial de Santander, Colombia
Cao Minh Ta, University of Hanoi, Vietnam
Vo Duy Thanh, University of Hanoi, Vietnam
Rochdi Trigui, IFSTTAR, France
Joao Trovao, Université de Sherbrooke, Canada
Joeri Van Mierlo, Vrije Universiteit Brussel, Belgium
Z. Q. Zhu, University of Sheffield, UK

Local Task Force

Task Force Co-chairs

Jorge García, University of Oviedo, Spain
Du Jiuyu, Tsinghua University, China

Honorary Members

Ana González, Mayoress of Gijón
Santiago García Granda, Dean of the University of Oviedo
Juan Carlos Campo, Director of the Polytechnic School of Engineering of Gijón
Cecilia Bethencourt, University of Oviedo Foundation, General Manager

Local Collaborators

Juan Díaz, GE2 Group, University of Oviedo, Spain
Jon Ander Lopez, IKERLAN, Spain
Cristina González, LEMUR Research Group, University of Oviedo, Spain
Eduardo Pilo, Francisco de Vitoria University, Spain
Diego Lamar, SEA Group, University of Oviedo, Spain
Alberto Martín Pernía, GE2 Group, University of Oviedo, Spain
Haizea Gastañaga, IKERLAN, Spain
Manuel Arias Pérez de Azpeitia, SEA Group, University of Oviedo, Spain
Juan Carlos Viera, SIME Group, University of Oviedo, Spain
Pablo García, LEMUR Research Group, University of Oviedo, Spain
Manuela González Vega, SIME Group, University of Oviedo, Spain
Eduardo Pilo, EPRail, Francisco de Vitoria University, Spain
Sandra Castaño, Politechnic University of Madrid, Spain
Bassam Mohamed, LEMUR Research Group, University of Oviedo, Spain
Manuel Díaz Millán, Head of Wiring Department, SEAT, Spain
Adriano Monés Bayo, Phoenix Contect, E-Mobility, Spain
Natán Parra, Rücker-Lypsa, Spain
Islam El-Sayed, LEMUR Research Group, University of Oviedo, Spain
Urtzi Armendariz, Head of Engineering, CAFTE, Spain
Javier Izquierdo, eMobility responsible at EDP, Spain
Nicolás de Abajo, Research and Development World Manager, Arcelor-Mittal, Spain

Local Task Force—Continued

International Collaborators

Paulo Pereirinha, Instituto Superior de Engenharia de Coimbra, Portugal
Zedong Zheng, Tsinghua University, China
Jorge Varela, Imperial College, UK
Federica Foiadelli, Politecnico di Milano, Italy
Clement Mayet, CNAM – SATIE, Paris
Giulio de Donato, Sapienza, University of Rome, Italy
Stuart Hillmansen, University of Birmingham, UK
Lance Jiang, CRRC, China
Xuning Feng, Tsinghua University, China
Liangfei Xu, Tsinghua University, China
Fabio Giulii Capponi, Sapienza, University of Rome, Italy
Zhongbei Tian, University of Birmingham, UK
Gui Liu, CRRC, China
Pietro Tricoli, University of Birmingham, UK
Zhongping Yang, Beijing Jiaotong University, China
Wei Liu, Southwest Jiaotong University, China
Andrea Mariscotti, ASTM, Switzerland
Mario Pagano, University of Naples – Federico II, Italy
Foad Heidari Gandoman, Vrije Universiteit Brussell, Belgium

Reviewers

Abdelmounaim Tounzi (University of Lille)
Abdoulaye Pam (University of Lille)
Abdussalam Elhanashi (University of Pisa)
Adolfo Dannier (Università degli Studi di Napoli Federico II)
Ahmed A. Raouf Mohamed (Arab Academy for Science, Technology & Maritime Transport, Egypt)
Alain Bouscayrol (University of Lille1)
Alberto Garcia (Oviedo University)
Alberto M. Pernía (University of Oviedo)
Alberto Martin (University Carlos III of Madrid)
Alejandro Fernández (Ikerlan)
Alejandro G. Yepes (University of Vigo)
Alessandro Serpi (University of Cagliari)
Alessandro Soldati (University of Parma, Parma (Italy))
Alexander Wasserburger (TU Wien)
Alexandre Silveira (Institute of Engineering of Porto, Portugal)
Ali Akrem Amamou (Université du Québec à Trois-Rivières (UQTR))
Ali Sari (Université de Lyon 1)
Alvaro Omar Macias Fernandez (Université du Québec à Trois-Rivières)
Américo Vicente Leite (Instituto Politécnico de Bragança)
Aman Kalia (University of Washington)
Amin Ghobadpour (Université du Québec à Trois-Rivières)
Amine Lahyani (Insat of Tunis)
Andoni Medina (University of Navarra)
Andoni Saez de Ibarra (IKERLAN Technology Research Centre)
André Mendes (University of Coimbra - IT)
Andrea Mariscotti (University of Genova)
Andres Jacome (University of Bourgogne Franche-Comṭ / CEA Grenoble)
Andrey Brazhnikov (Siberian Federal University)
Angel Navarro Rodriguez (University of Oviedo)
Anh Dung Nguyen (Virginia Tech)
Arash Khalatbarisoltani (Université du Québec à Trois-Rivières)
Arnaud Gaillard (Univ. Bourgogne Franche-Comte, UTBM)
Arnaud Videt (University of Lille)
Aurelien Lievre (Valeo)
Aydin Zaboli (Amirkabir University of Technology)
Baghdadi Issam (Groupe PSA)
Bao-Huy Nguyen (Universiṭe de Sherbrooke)
Barys Shyrokau (TU Delft)
Bill Insup Kim (AVL Powertrain UK)
Cai Shun (Sheffield University)
Calin Husar (Siemens Industry Software Romania)
Carlos Felgueiras (Institute of Engineering of Porto, Portugal)
Cecilio Blanco Viejo (Universidad de Oviedo, Spain)
Chao Jia (University of Nebraska-Lincoln)
Chaoxian Wu (Xi'̣an Jiaotong-Liverpool University)
Chris Aksland (University of Illinois at Urbana-Champaign)
Chunhua Liu (City University of Hong Kong)
Chunlin Liu (Hong Kong City University)
Cláudio Pinto (Continental Engineering Services Portugal)
Clement Depature (SNCF)
Clement Mayet (Conservatoire National des Arts et Métiers)
Daniel Barth (Karlsruhe Institute of Technology)
Daniel Montesinos-Miracle (Polytechnic University of Catalonia)
Daniel Serrano (Mondragon University)

Reviewers-Continued

David Ansean (University of Oviedo, Asturias, Spain)
David Marcos Guerrero (Ikerlan Technology Research Centre (BRTA))
Davide Tebaldi (University of Modena and Reggio Emilia)
Denis Candusso (IFSTTAR - SATIE)
Anatole Desreveaux (University of Lille)
Diana Sofia Mendoza (Universidad Industrial de Santander)
Diego Pérez (University of Vigo)
Diego Rios (CTAG)
Dingcheng Zhang (University of Birmingham)
Domenico Giordano (INRIM)
Donald Docimo (Texas Tech)
Dong Hao (CATARC)
Dongmin Miao (3-Phis Technology)
Duc Tan Vu (Arts et Metiers ParisTech)
Edis Eduard Raclaru (Siemens Industry Software Romania)
Eduardo Pilo (Universidad Francisco de Vitoria)
Eduardo Redondo-Iglesias (Univ. Eiffel)
Ehsan Sabri Islam (Argonne National Laboratories)
Emerson Giovani Carati (Universidade Tecnológica Federal do Paraná)
Emmanuel Vinot (IFSTTAR)
Emre Gurpinar (Oak Ridge National Laboratory)
Eneko Gonzalez (Ikerlan Technology Research Centre)
Enrique Granada (University of Vigo)
Eric Hittinger (Univ of Lille)
Eric Williams (RIT)
Erik Hoevenaars (Robert Bosch GmbH)
Erik Schaltz (Aalborg University)
Fabio Mottola (University of Naples Federico II)
Federico Martin Ibanez (Skoltech Faculty)
Feng Wang (Xi'an Jiaotong University)
Filipe Joel Soares (INESC TEC)
Florentin Salomez (University of Lille)
Florian Verbelen (Ghent University)
Foad H Gandoman (Vrije Universiteit Brussel (VUB))
Gabriel Pinto (University of Minho)
Giambattista Gruosso (Politecnico di Milano)
Giancarlo Storti Gajani (Politecnico di Milano)
Giulio Dedonato (University of Rome)
Guo Xizheng (Beijing Jiaotong University)
Guofeng Yuan (North China University of Technology)
Hao Zhang (Southwest Jiaotong University)
Hao Yuan (CRRC)
Haritza Camblong (University of the Basque Country)
Hendrik Vansompel (Ghent University)
Henry Miniguano (Universidad Carlos III de Madrid, Spain)
Herman Hamersma (University of Pretoria)
Herschel C. Pangborn (Pennsylvania State University)
Hongbo Li (CRRC Zhuzhou Institute)
Hongzhi Dong (Southwest Jiaotong University)
Hussein Basma (Ecole des Mines de Paris)

Reviewers-Continued

Iosu Aizpuru (Mondragon Unibertsitatea)
Ivan Spina (Università degli Studi di Napoli Federico II)
Javier Solano (Universidad Industrial de Santander)
Jean-Claude De Jaeger (University of Lille)
Jennifer Hatch (BU)
Jesus Doval-Gandoy (University of Vigo)
Jesus Sergio Artal-Sevil (Universidad de Zaragoza)
Jian Zhang (Southwest Jiaotong University)
Jian-Xin Shen (Zhejiang University)
Jiaqiang Yang (Zhejiang University)
Jihun Han (Argonne National Laboratory)
Jin Liu (Newcastle University)
Jinfeng Li (Imperial College London)
Jiuyu Du (Tsinghua University)
João Cunha Ramos (INESC TEC)
João Marttins (Universidade Nova de Lisboa)
Joao Pedro Trovao (University of Sherbrooke)
Joel Anttila (VTT - Technical Research Centre of Finland)
John Helveston (George Washington University)
Jon Ander López-Ibarra (IKERLAN Technology Research Centre)
Jon Gastelurrutia (Ikerlan Technology Research Centre)
Jonas Mirwald (German Aerospace Center)
Jongryeol Jeong (Argonne National Laboratory)
Jorge Alonso del Valle (Universidad de Oviedo)
Jorge Garcia (University of Oviedo)
Joris Jaguemont (Vrije University of Brussels)
José Villar (INESC TEC)
Jose Antonio Garcia-Souto (Universidad Carlos III de Madrid)
Jose Antonio Villarejo (Polytechnical University of Cartagena)
Jose Manuel Sierra (Oviedo University)
Jose Miguel Sanz-Alcaine (University of Zaragoza)
Josu Olmos (IKERLAN Technology Research Centre)
Joubert Charles (Ampre Lab)
Juan C. Viera (University of Oviedo, Asturias, Spain)
Juan Carlos Alvarez Anton (Universidad de Oviedo)
Juan M. Rey (Universidad Industrial de Santander, Bucaramanga, Colombia)
Julian Taube (Technical University of Munich)
Julien Pouget (HEI HES-SO Valais-Wallis, Sion, 1950, Switzerland)
Justino Rodrigues (INESC TEC)
Ke Li (Coventry University)
Ke Wang (Chinese Academy of Sciences)
Kehui Ji (Zhejiang Sci-Tech University)
Kevin Martin (Dyson Technology Ltd)
Laura Roberson (GWU)
Leo Wildfeuer (Technical University of Munich)
Li Bailing (Beijing Jiaotong University)
Li Qinglai (Beijing Jiaotong University)
Liu Jianqiang (Beijing Jiaotong University)
Loris Pace (University of Lille)
Lu Jinxin (Beijing Jiaotong University)
Luca Bascetta (Politecnico di Milano)
Luca D'Acierno (University of Naples Federico II)
Luciano Sanchez Ramos (Universidad de Oviedo)
Ludovic Horrein (University of Lille)
Luigi Pio Di Noia (Università degli Studi di Napoli Federico II)
Luis Silva (Universidad Nacional de Rafaela)
Luis Vaccaro (University of Genova)
Lujin Zhao (GWU)

Reviewers-Continued

Madalsa Singh (Stanford University)
Manuel Pereira (Faculty of Engineering, University of Porto)
Manuel Rico-Secades (University of Oviedo)
Manuela González (University of Oviedo, Asturias, Spain)
Marc Gallet (TUMCREATE Ltd.)
Mariam Saeed Hazkial (Universidad de Oviedo)
Marilisa Botte (University of Naples Federico II)
Marino Coppola (Università degli Studi di Napoli Federico II)
Mario Porru (University of Cagliari)
Martin Baumann (BMW Group)
Martin Doppelbauer (Karlsruher Institut für Technologie (KIT))
Masahiro Fukui (Ritsumeikan University)
Matthieu Ponchant (Siemens Industry Software SAS)
Mauro Salazar (Eindhoven University of Technology)
Mebrahtom Beraki (University of Sherbrooke)
Mehrnaz Farzam Far (VTT Technical Research Centre of Finland Ltd)
Miguel J. Prieto (Universidad de Oviedo)
Mihail Grovu (Siemens Industry Software Romania)
Mikaela Ranta (VTT)
Milos Lukic (University of Nottingham)
Mingdi Fan (Soochow University)
Minh C. Ta (Hanoi University of Science and Technology)
Mohamed EL Baghdadi (Vrije Universitei Brussel)
Mohammed Mahedi Hasan (Vrije Universiteit Brussel)
Mohsen Kandi (U. of Sherbrooke)
Monowar Hossain (Deakin University, Australia)
Mostafa Shaban Ahmed (University of Windsor, Canada)
Nadir Idir (University of Lille)
Nakaret Kano (University of Birmingham)
Namdoo Kim (Argonne National Laboratory)
Nassim Noura (Université du Québec à Trois-Rivières)
Nerea Goitia-Zabaleta (IKERLAN)
Nguyen Thi Phuong Chi (University of Sherbrooke, Quebec, Canada)
Nguyen Xuan Bac (Nanyang Technological University)
Nirmit Prabhakar (Argonne National Laboratory)
Nuno Faria (Polytechnic Institute of Coimbra (IPC-ISEC))
Olivier Renaudin (Universitat Autònoma de Barcelona)
Orhan Yaman (Firat University)
Ottorino Veneri (CNR - Istituto Motori)
Ouenzerfi Safouene (Universiț Polytechnique Hauts-de-France)
Pablo Arboleya (University of Oviedo)
Pablo Quintana (Universidad de Oviedo, Spain)
Pascal Messier (Universiț de Sherbrooke)
Patrick Bartholomeus (Centrale Lille, EA 2697 L2EP)
Paulino José García Nieto (Universidad de Oviedo, Spain)
Paulo G. Pereirinha (IPC-ISEC, Polytechnic Institute of Coimbra)
Pedro Melo (School of Engineering, Polytechnic of Porto)
Petr Hajduk (VTT - Technical Research Centre of Finland)
Phil Sharer (Argonne National Laboratory)
Philippe Delarue (University of Lille - LEP)
Phuong Vu (Hanoi University of Science and Technology)
Pierluigi Caramia (Università di Napoli Parthenope)
Pierpaolo Dini (University of Pisa)
Pilar Meneses (IKERLAN Technology Research Centre)

Reviewers-Continued

Qingsong Wang (Coventry University)
Quanqing Yu (Harbin Institute of Technology)
Rabih Al Haddad (Lebanese American University)
Ram Vijayagopal (Argonne National Laboratory)
Ramy Georgious (University of Oviedo)
Ranjit Desai (NREL)
Ricardo de Castro (German Aerospace Center (DLR))
Roberto Diaz (University of Vigo)
Roberto Zanasi (University of Modena and Reggio Emilia)
Ronan German (University of Lille)
Ruben Muñiz (Oviedo University)
Rui Esteves Araujo (University of Porto, Faculty of Engineering)
Ryan O. Berriel (L2ep, University of Lille)
Samir Jemeï (University of Franche Comte)
Saptarshi Das (NYSERDA)
Sarah Saeed (University of Oviedo)
Seho Park (Pusan National University)
Serge Pelissier (Universite Gustave EIFFEL)
Sergio Toscani (Politecnico di Milano)
Serguei Martemaniov (Univ. Poitiers)
Sheldon Williamson (UOIT)
Sheng Li (ZJU)
Shuai Lin (Beijing Jiaotong University)
Simone Barcellona (Politecnico di Milano)
Soukaina Boudoudouh (Mohammed V University, Morocco)
Sousso Kelouwani (Université du Québec à Trois-Rivières)
Suprijanto (Institut Teknologi Bandung)
Sylvain Pagerit (Argonne National Laboratory)
Tajud Din (University of Birmingham)
Tao Fan (Institute of Electrical Engineering of Chinese Academy of Sciences)
Tat-Thang Le (Seoul National University of Science and Technology)
Thanh Vo-Duy (Hanoi University of Science and Technology)
Thannehene Gedara Thusitha Asela Bandara (University of Oviedo, Spain)
Thijs Purnot (TNO)
Tommaso Transi (University of Nottingham)
Tony Letrouvé (SNCF I&R)
Tournez Florian (University of Lille)
Edgar Tournon (Universite Claude Bernard Lyon 1)
Tran Huynh Ngoc (Toyota Technological Institute)
Unai Iraola (Mondragon Unibertsitatea)
Van Thang Do (University of Sherbrooke)
Victor Herrera Perez (Escuela Superior Polit´ecnica de Chimborazo)
Viktor Skrickij (Vilnius Gediminas Technical University)
Vincent Freyermuth (Argonne National Lab)
Vitor Monteiro (University of Minho)
Vitor Torquato Arioli (CPqD)
Walter Lhomme (University of Lille)
Wang Renguang (China Automotive Technology and Research Center Co.,Ltd)
Wang Xiaofan (Beijing Jiaotong University)
Wei Liu (Southwest Jiaotong University)
Wenwen Zhou (PONOVO POWER Co., Ltd.)
Wu Weiping (CRRC)

Reviewers-Continued

Xavier Dominguez (University of Oviedo)
Xavier Margueron (Ecole Centrale de Lille)
Xiaoqin Zheng (Qingdao University)
Xiaosong Hu (Chongqing University)
Xin Li (Lanzhou Jiaotong University)
Xuefei Qin (Zhejiang University)
Ya-Xiong Wang (Beijing Institute of Technology)
Yancho Todorov (VTT Technical Research Centre of Finland Ltd.)
Yanggu Zheng (Delft University of Technology)
Yao-Ching Hsieh (National Sun Yat-Sen University, Taiwan)
Yifan Lu (Tsinghua University)
Yilin Chen (University of Birmingham)
Yinyu Chen (Southwest Jiaotong University)
Yizhe Zhang (University of Birmingham)
Yunchong Wang (Hong Kong Poly Univ.)
Zedong Zheng (Tsinghua University)
Zezheng Wu (Zhejiang University)
Zhao Ziwei (Beijing Jiaotong University)
Zhihong Zhong (Beijing Jiaotong University)

Workshop

Virtual Product Development and Production of All Types of Electrified Vehicles and Components

Presenter: Alain Bouscayrol, Univ. Lille, PANDA project, France
Presenter: Valentin Ivanov, Tech. Univ. Ilmenau, XILforEV project, Germany
Presenter: Reinhard Tatschl, AVL, VISION-xEV project, Austria
Presenter: Enric Aramburu, Idiada, USPCALE project, Spain

Alain Bouscayrol received the Ph.D. degree in Electrical Engineering from Institut National Polytechnique de Toulouse, France, in 1995. From 1996 to 2005, he was Associate Professor at University of Lille, France, where he has been a Professor since 2005.

From 1998 to 2004, he managed the Multi-machine Multi-converter Systems project of GdR-ME2MS, national research program of CNRS (French National Centre of Scientific Research). From 2004 to 2019, he managed the national network on Energy Management of Hybrid Electric Vehicles (MEGEVH) France. Since 2015, he has been coordinator of the CUMIM (Campus of University with Mobility based on Innovation and Neutral carbon) interdisciplinary program of University of Lille. Since 2018, he has been co-director of the international research lab e-CAMPUS on sustainable mobility and also coordinator of PANDA a European H2020 project on simulation and testing of electrified vehicles.

His research includes graphical descriptions (Energetic Macroscopic Representation, etc.) for control of electric drives, renewable energy conversion systems, electrified vehicles and hardware-in-the-loop testing. His collaborative works with industry on energy management for vehicles include Siemens, PSA Peugeot Citroen, Valeo, Renault and SNCF. In January 2014, he has been nominated Chair of the Vehicle Power Propulsion technical committee by IEEE Vehicular Technology Society. From 2014 to 2018, he was Associate Editor of IEEE transactions on Vehicular Technology. Since 2016, has been elected Distinguished Lecturer by IEEE VTS.

Valentin Ivanov received the Ph.D. degree in 1997 and the D.Sc. degree in 2006 in Automotive Engineering from Belarusian National Technical University in Minsk, where he worked successively as Assistant, Associated and Full Professor. In 2007, as a Research Professor, he became an Alexander von Humboldt Fellow and in 2008 a Marie Curie Fellow with Technische Universität Ilmenau, Germany.

Currently he is working at TU Ilmenau with the Automotive Engineering Group as the coordinator of several European industrial-academic projects and Marie Skłodowska-Curie Actions. Valentin Ivanov is SAE Fellow, IEEE senior member, member of Society of Automotive Engineers of Japan and the Association of German Engineers. He is a recipient of SAE Ralph R. Teetor Educational Award and CADLM Intelligent Optimal Design Prize. His research fields are vehicle dynamics, electric vehicles, and automotive control systems

Reinhard Taschl is Research and Technology Manager in the business unit Advanced Simulation Technologies of AVL List GmbH. With about 4300 employees in Austria and more than 11500 worldwide, AVL is the world's largest independent company for development, simulation and testing technology of all kinds of powertrains for passenger cars, trucks and large engines. Reinhard graduated in Mechanical Engineering and received his PhD at Graz University of Technology. After his studies he joined AVL in 1991 as research engineer in the field of Computational Fluid Dynamics (CFD) modelling and simulation. From 2000 onwards Reinhard was heading the CFD software development team before taking over the current position as Research and Technology Manager in 2012.

Enric Aramburu is the IDIADA Fluid Engineering Product Manager and the Body Development department R+D manager. He holds a Mechanical Engineering degree and a Master in Numerical Methods applied to. His current responsibility is related with business development of the aerodynamics & CFD services within IDIADA. Mr. Aramburu has been working in the automotive industry for more than 25 years, as CFD engineer in companies such as SEAT, Simulogica or SENER Ingenieria & Sistemas. He joined IDIADA in 2004 and has participated in several R+D projects, such as, Supercalculus, Sartre, Convenient, Companion, Resolve, Domus, Cronuz or UPSCALE (project coordinator) and has been involved in more that 50 vehicle development programs with different automotive OEMs, such as, SEAT, AUDI, SKODA, GEELY, PSA Group, TOYOTA, TATA, GEELY, NISSAN, NIO, CNH-I, MAN, etc.. Besides his responsibilities as owner of the Fluid Engineering product, Mr. A is coordinating the Innovation activities within the Body Development department.

Abstract: Many H2020 projects are ongoing on the simulation of electrified vehicles. Four projects have been selected for the call LC-GV-02-20181 (Virtual product development and production of all types of electrified vehicles and components) These calls aim to propose significant advances in digitization leading to new opportunities for the automotive industry in terms of virtual product development and production, reducing the time-to-market of all types of electrified vehicles at lower costs.

This workshop aims to present the objective and recent development of the four H2020 projects of this call:

1) **PANDA** - Powerfull Advanced N-Level Digital Architecture for models of electrified vehicles and their components
Framework: Horizon 2020, GV-02-2018, GA # 824256
Coordinator: University of Lille, France
URL: https://project-panda.eu/

PANDA aims to reduce the development time of electrified vehicles through standardization of the model/simulation, thereby enabling: 1) an easy reuse of models for different tasks and; 2) a reduction of the real testing of subsystems by virtual seamless testing. The main goal of the PANDA project is to provide unified organizations of digital models for seamless integration in virtual and real testing of all types of electrified vehicles and their components.

2) **XILforEV** - Connected and Shared X-in-the-loop Environment for EV Development
Framework: Horizon 2020, GV-02-2018, GA # 824333
Coordinator: TU Ilmenau, Germany
URL: https://xil.cloud/

XILforEV aims to develop a complex experimental environment for designing electric vehicles and their systems, which connects test platforms and setups from different domains and in different geographical locations. The project outcomes cover hardware and software components for xin the-loop environments, machine learning tools to improve real-time model accuracy and performance as well as high-confidence, real-time capable models with automatic validation using experimental data. The XILforEV technology is demonstrated for four use cases dedicated to the design of brake blending, ride blending, integrated EV chassis control and fail-safe EV powertrain control.

Workshop-Continued

3)**VISION-xEV** - Virtual Component and System Integration for Efficient EV
Framework: Horizon 2020, GV-02-2018, GA # 824314
Coordinator: AVL, Austria
URL: https://vision-xev.eu/

VISION-xEV aims to develop and demonstrate a generic virtual component and system integration framework for the efficient development of all kinds of future electrified powertrain systems. The main goal is to develop novel high-fidelity reduced order models, related parameterization methodologies as well as interfacing and co-simulation methods to enable seamless coupling of models regardless of the underlying modelling platform. The VISION-xEV approach will be demonstrated for selected industrial use-cases related to the virtual development of future electrified powertrain systems.

4) **UPSCALE** - Upscaling Product development Simulation Capabilities exploiting Artificial inteLligence for Electrified vehicles
Framework: Horizon 2020, GV-02-2018, GA # 824306
Coordinator: IDIADA Automotive Technology SA, Spain
URL: https://www.upscaleproject.eu/

UPSCALE aims to demonstrate the feasibility of using AI enhanced CAE methods in EV development processes, such as vehicle aerodynamics, battery thermal modelling and crash simulation and leading the deployment of AI tools for other CAE applications. UPSCALE is the first EU-project that has the specific goal to integrate artificial intelligence (AI) methods directly into traditional physics-based Computer Aided Engineering (CAE)-software and –methods.

Tutorials

T1 - SIC Reliability Testing for Automotive and Traction Applications

Instructor: Francesco Iannuzzo

Francesco Iannuzzo received the M.Sc. degree in Electronic Engineering and the Ph.D. degree in Electronic and Information Engineering from the University of Naples, Italy, in 1997 and 2002, respectively. He is primarily specialized in power device modelling.
He is currently a professor of reliable power electronics at the Aalborg University, Denmark, where he is also part of CORPE, the Center of Reliable Power Electronics. His research interests are in the field of reliability of power devices, including mission-profile based life estimation, condition monitoring, failure modelling and testing up to MW-scale modules under extreme conditions. He is author or co-author of more than 230 publications on journals and international conferences, three book chapters and four patents. Besides publication activity, over the past years he has been contributing 17 technical seminars about reliability at first conferences as ISPSD, EPE, ECCE, PCIM and APEC.
Prof. Iannuzzo is a senior member of the IEEE (Industry Application Society, Reliability Society, Power Electronic Society, and Industrial Electronic Society). He currently serves as Associate Editor for the IEEE Journal of Emerging and Selected Topics in Power Electronics, Transactions on Industry Applications, the EPE Journal, and Elsevier Microelectronics Reliability. He is vice-chair of the IEEE IAS Power Electronic Devices and Components Committee. In 2018 he was the general chair of the 29th ESREF, the first European conference on the reliability of electronics, and has recently been appointed general chair for the EPE 2023 conference in Aalborg.

Abstract: The tutorial introduces the modern principles of testing for reliability of modern power electronic components. After a short introduction about CORPE – the center of Reliable Power Electronics at Aalborg University, expectations from power electronics industries will be presented. Some reliability theory fundamentals will be given, along with practical details about common testing protocols. Wear/life testing types will be then presented and classified, each with its specific aim. The last part will be about the original test approach at Aalborg University used for Silicon Carbide MOSFETs, which are becoming very appealing for the automotive market. Some prospects about failure analysis will conclude the tutorial.

T2 - Understanding the Science and Engineering of Electric Vehicle Battery Safety

Instructors: Xuning Feng and Jorge Varela Barreras

Xuning Feng, Assistant Professor with School of Vehicle Mobility, Tsinghua University. Research interest include the battery safety for electric vehicle: characterization and modelling, and the battery system for electric vehicle: state estimation, thermal management, fault diagnosis. My research objectives are to solve engineering science problems that are pertinent to the application of new energy vehicles; to develop technologies to enable safe and efficient operation of electrochemical power sources; and to bridge the technology gaps between basic science of cell materials and commercial vehicle applications by developing methodologies and tools for battery characterization and management. My major contributions in engineering science include 1) conceived and developed technologies and methodologies for preventing thermal runaway of large-format lithium-ion traction batteries. 2) Pioneered in adiabatic thermal runaway test of large-format lithium-ion traction batteries, making the thermal runaway behavior measurable. 3) Established thermal runaway initiation and propagation models for the safety design of battery pack, making the thermal runaway behavior predictable. 4) Developed online diagnosis algorithm for battery degradation and internal-short-circuit, making the battery state-of-health online evaluable. 5) Implemented and validated most of the strategies and algorithms on industrial battery systems, demonstrated their effectiveness.

Jorge Varela Barreras, Senior Researcher with Imperial College London, and Joint Chair of IEEE UK & Ireland Education Society. My current research interests are: electro-thermal battery modelling and characterization, advanced battery balancing systems, BMS and HV battery pack design and testing, battery diagnosis and prognosis methods, derating power strategies, proactive and reactive strategies for battery safety management, and novel EV and BESS architectures. My main research goal is to develop experimental and modelling tools that enable decarbonisation of the energy sector and transportation at a global scale and bring academic knowledge into industry and policymakers. So far, my major contributions in the field are: 1) a multi-awarded novel EV architecture based on fixed and swappable battery packs; 2) multi-awarded theoretical and practical developments of a new generation of active balancing systems, i.e. multi-objective smart and hybrid balancing systems; 3) pioneering works in BMS testing on hardware-in-the-loop simulators; 4) introduction of a number of simplified methods for electrical battery modelling; 5) development of EV battery safety training courses for emergency response services and industry; 6) guest editor of a special issue in EV battery safety in eTransportation by Elsevier.

Abstract: This tutorial presents and discusses an introduction to EV battery safety technology, from both a theoretical and a practical perspective, focusing on proactive and reactive safety measures, and covering design, modelling, analysis, testing, or battery management system related issues. The tutorial is divided into two different parts. In the first part, we start from the basics, giving definitions and classifications around EVs, lithium-ion battery systems and management systems. Then we introduce the principles of safety philosophy and lay down the safety terminology. Next, we list and describe the different EV battery safety hazards, including explosive, flammable, oxidizing, electrical, chemical, or heat hazards. In the second part, we review practical state-of-the-art approaches to improve safety, covering both proactive and reactive strategies to prevent and control the risks. For each hazard, we present and discuss practical safety measures at different levels (cell to vehicle and environment) and product life cycle stages.

T3 - State of Health Determination of Lithium-Ion Batteries: Mechanistic Modeling Approach

Instructor: David Anseán, University of Oviedo, Spain

David Anseán received the M.Eng. degree from the University of Granada, (Spain), in 2007, and the Ph.D. degree (with honors) from the University of Oviedo, (Spain), in 2015, both in electronics engineering.

Before pursuing his PhD, he gained international industry experience (Basingstoke, U.K., and Berkeley, CA, USA) in technological companies. As a doctoral student, he was the recipient of a research fellowship stay at the Electrochemical Power Systems Laboratory, at the University of Hawaii, USA, which he later joint as a Postdoctoral Fellow, to work in Dr. Dubarry's group on advanced diagnosis and prognosis techniques on lithium-ion batteries on.

Since 2016 he is an Assistant Professor at the University of Oviedo, where he is the instructor of undergraduate and graduate courses including power electronics, digital integrated circuits, and embedded systems. His research interests include lithium-ion battery degradation mechanisms analysis via non-invasive methods, battery testing and characterization, and design of battery fast charging.

In 2018 and in 2019 he was the recipient of Visiting Scholar Research Fellowships and joined the Institute for Power Electronics and Electrical Drives (ISEA) at RWTH Aachen University (Germany), and the Electrochemical Power Systems Laboratory, at the University of Hawaii, (USA), respectively.

Abstract: The tutorial will first cover the fundamentals of lithium-ion batteries to gain the required knowledge on cell degradation mechanisms. Then, we will provide the necessary tools, concepts and best practices to both carry out the battery laboratory testing for in-situ aging mode identification and the battery model construction. We then present how linking battery testing data with reconstructed modeling allows us to decipher both qualitatively and quantitatively the underpinning aging modes ongoing on a given battery. These findings lead to battery diagnosis and prognosis. The last part will be interactive and feature live analysis using Matlab®-based toolbox, specifically designed to simplify the use of these techniques, help diagnose the Stat of Health and identify and quantify the underlying degradation modes. Attendees will be able to adopt a pro-active attitude during a hands-on toolbox demonstration, as part of this short course.

T4 - Real-Time Simulation in the Hardware-in-the-Loop Environments

Instructors: Dragan Zuber and Philippe Barrade

Dragan Zuber is a business developer at Typhoon HIL for almost 8 years already and he's a veteran when it comes to HIL technology

Dr. Philippe Barrade (member of the IEEE) received the Ph.D. degree in Electrical Engineering in 1997 from INP, Toulouse, France. In 1998, he was working at SAFT, in the field of power electronics and energy management for UPS applications. From 1999 to 2014, he was Senior Scientist, Lecturer at Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland.

Since 2015, he is Professor at the University of applied Science, HES-SO Valais, Switzerland. His main research fields are power electronics applications, energy management and storage, including Multiphysics systems modelling. He develops actually a strong activity of real-time simulation and hardware-in-the-loop simulation, linked to methodologies for systems virtual design.

Abstract: The first part of the tutorial will cover the Typhoon HIL real-time simulation capability brief, presented by Dragan Zuber. The second part will be dedicated to examples in using real-time simulators in hardware-in-the-loop environments, presented by Dr. Philippe Barrade.

Basic example will be provided first in the frame of pedagogical activities, aiming in pre-testing control algorithms on real-time simulators before deporting such a control on a real device. More advanced design methodologies will be introduced, using HIL systems in replacement of conventional simulation tools to design simultaneously a power conversion structure and its dedicated control. This part will be concluded with basis on co-simulation, aiming at coupling with HIL devices other simulation tools to constraint the system to be studied.

Keynotes

Jianghua Feng, Vice President and CEO, CRRC Zhuzhou Institute Co., Ltd

Title: “Virtual Rail Intelligent Express System”

Dr. Jianghua Feng, received his B.S. degree and M.S. degree in Electric Machine and Control from Zhejiang University, Hangzhou, China respectively in 1986 and 1989 and his Ph. D. degree in Control Theory and Control Engineering from Central South University, Changsha, China in 2008. He joined CRRC Zhuzhou Institute Co. Ltd., Zhuzhou, China in 1989, and now he is the VP and CEO of CRRC Zhuzhou Institute Co., Ltd, and the director of the State Key Laboratory of New Power Semiconductor Devices. He has been engaged in railway electric drive control and system engineering research for a long time, and has devoted himself to the study of the theory and method of motor and converter control, decentralized system cooperative control, system stability, etc., and is committed to train traction system integration and platform product engineering research. He is now a professorate senior engineer and has 51 published journal papers, some of them were published in Proceedings of China Internet, IEEE International Symposium on Industrial Electronics, International Power Electronics and Motion Control Conference, IEEE Conference on Industrial Electronics and Applications, IPEC, IECON, ICEMS.

Abstract: ‘Due to the role of track guidance, bearing and constraint, rail trains have the advantages of large volume and high efficiency, and have been the backbone of urban transportation for a long time. However, due to the harsh smoothness and other requirements of the track, the system construction, operation and maintenance are complicated and costly. Therefore, the industry has been exploring new types of trains, simplifying the requirements of vehicles on the track structure, and innovating straddle-type monorail trains, guideway type rubber trolleybuses, etc., so as to change the solid track from double track to monorail. Whether the dependence on the physical track can be completely overturned is a new technical challenge.

The virtual track intelligent express system is the first to create a new multi-group articulated rubber-tyred train based on the virtual track, which completely replaces the physical track through technologies such as path perception and active guidance control. Since 2010, it has undergone an iterative innovation process such as concept research, principle verification, prototype testing, and engineering demonstrations, it made its world premiere in 2017.

This system creates a new rail transit system, which can be widely used in the network connection or extension of metropolitan rail transit, the construction of backbone transportation systems in small and medium cities, and the operation of special lines such as tourist attractions. Compared with trams, the overall cost is only about 1/3, the construction period is only about 1/2, it can be flexibly configured and quickly form a transportation network. Taking the 17.7km T1 line of Sichuan Yibin, where the system is applied, as an example, it saves about 1.7 billion yuan in investment compared with the tram system.

Keynote Feng—Continued

The emergence of this system has injected strong original innovation power into the diversified and deep development of the world's rail transit. It has outstanding characteristics and obvious advantages. It has a broad market application space in the future and has great potential for sustainable development.

Keynotes

Luis (Nando) Ochoa, Professor, Smart Grids and Power Systems, University of Melbourne, Australia

Title: "Making Electric Vehicles and the Grid Work Together"

Luis (Nando) Ochoa is Professor of Smart Grids and Power Systems at The University of Melbourne, Australia and part-time Professor of Smart Grids at The University of Manchester, UK. His expertise in network integration of distributed energy resources (DER) and his extensive portfolio of industrial and academic projects have led to 170+ publications, 60+ technical reports, and two patents, one filed by Psymetrix Ltd (now part of GE) and one filed by The University of Melbourne. Prof Ochoa is an IEEE PES Distinguished Lecturer and is also Editorial Board Member of the IEEE Power and Energy Magazine. Prof Ochoa is an IEEE Senior Member since 2012. He holds a Bachelor's degree in Mechanical and Electrical Engineering from UNI (Peru), and a Research MSc and a PhD in Electrical Power Engineering, both from UNESP Ilha Solteira (Brazil).

Abstract: The increasing adoption of electric vehicles (EVs) will pose significant technical and economic challenges on the power grid, particularly on very infrastructure they are connected to: the electric distribution network. These networks have been traditionally designed to have no or limited controllability and, hence, are largely unmonitored. They will become the bottlenecks and therefore understanding how to best integrate EVs is critical to facilitate the electrification of our transport.

This keynote will discuss the impacts of EVs and the challenges faced by distribution companies. Furthermore, it will present some of the findings of the large-scale UK trial "My Electric Avenue" in which more than 200 EVs were monitored for over a year to understand usage patterns as well as to test the effectiveness of EV charging point management to avoid network issues. The keynote will also provide an overview of the challenges brought by fast-charging stations and the need for future cities to have holistic planning approaches that involve traffic flows.

Keynotes

Eric Cheng, Professor, Department of Electrical Engineering and Director of the Power Electronics Research Centre, The Hong Kong Polytechnic University

Title: "Power Electronics Research Development for Energy Storage and Electric Vehicle"

Prof Eric Cheng received the B.Sc. and Ph.D. degrees from the University of Bath, Bath, U.K., in 1987 and 1990, respectively. Before joining The Hong Kong Polytechnic University, Hong Kong, in 1997, he was with Lucas Aerospace, London, U.K., as a Principal Engineer. He is currently a Professor and the Director of the Power Electronics Research Centre, Department of Electrical Engineering, Faculty of Engineering, The Hong Kong Polytechnic University. He has authored or co-authored over 400 papers and 7 books. His research interests include all aspects of power electronics, motor drives, electromagnetic interference, electric vehicles, battery management, and energy saving. Dr. Cheng was a recipient of the Institution of Electrical Engineers Sebastian Z De Ferranti Premium Award in 1995, the Outstanding Consultancy Award in 2000, the Faculty Merit Award for Best Teaching in 2003 from The Hong Kong Polytechnic University, the Faculty Engineering Industrial and Engineering Services Grant Achievement Award in 2006, the Brussels Innova Energy Gold Medal with Mention in 2007, the Consumer Product Design Award in 2008, the Electric Vehicle Team Merit Award of the Faculty in 2009, the Geneva Invention Expo Silver Medal in 2011, the Eco Star Award in 2012, the Gold prize at Seoul International Invention Fair in 2015, the iCAN Gold Medal at Canada in 2016, and Gold Award of HK Innovation and Technology in 2017.

Abstract: Power electronics is an enabli9ng technology for power conversion. The key components of an Electric Vehicle are the battery and the motor drive. Energy storages such as batteries and super-capacitors are now the major units. Energy cell packaging is now a new direction. The use of energy cells to integrate with the vehicle body has been reported and suggests good potential for energy management. The energy management and balance is now a necessary component to manage the energy cells. Besides the energy storage and the traction motor and drives, there are numerous motors and actuators used in modern electric vehicles. One of them is an active suspension system to replace the conventional hydraulic system. The In-wheel motor is based on integrating the motor and wheel into a single unit that increase the power density and presents a real 4-wheel drive. The skid steering can, therefore, be realized. Also, the anti-lock braking (ABS) is an all-electric braking system, and replaces the conventional hydraulic system in ABS.

An extensive overview of the latest electric vehicle technology is presented. The talk covers the major advanced components of an electric vehicle and the technology and research related to the development, and its associated power electronics development. Finally, the talk is concluded with an outlook on future vehicles.

Keynotes

Alexander M. Wyglinski, Professor, Electrical and Computer Engineering and Robotics Engineering, Worcester Polytechnic Inst., USA

Title: "Bumblebee-Inspired Connected Vehicles: What's All The Buzz About"

Dr. Alexander M. Wyglinski is an internationally recognized expert in wireless communications, cognitive radio, 5G, connected vehicles, software-defined radio, dynamic spectrum access, electromagnetic security, vehicular technology, wireless system optimization and adaptation, autonomous vehicles, and cyber-physical systems. Dr. Wyglinski is a Full Professor of Electrical and Computer Engineering and a Full Professor of Robotics Engineering (courtesy appointment) at Worcester Polytechnic Institute, Worcester, MA, USA, as well as the Director of the Wireless Innovation Laboratory (WI Lab). Dr. Wyglinski is very active in the technical community, serving on the organizing committees of numerous technical conferences and several journal editorial boards. These activities include serving as the General Co-Chair for the 82nd IEEE Vehicular Technology Conference in Fall 2015. Dr. Wyglinski's editorial board commitments include the IEEE Communications Magazine, IEEE Transactions on Wireless Communications, and IEEE Transactions on Communications. From January 2018 to December 2019, Dr. Wyglinski served as the President of the IEEE Vehicular Technology Society, an applications-oriented society of approximately 5100 members that focuses on the theoretical, experimental, and operational aspects of electrical and electronics engineering in mobile radio, motor vehicles, and land transportation. Throughout his academic career, Dr. Wyglinski has published approximately 45 journal papers, over 90 conference papers, nine book chapters, and three textbooks. He is currently being or has been sponsored by organizations such as the Defense Advanced Research Projects Agency, the Naval Research Laboratory, MITRE Corporation, MIT Lincoln Laboratory, the Office of Naval Research, the Air Force Research Laboratory Space Vehicles Directorate, The MathWorks, Toyota InfoTechnology Center U.S.A., and the National Science Foundation. Dr. Wyglinski is a Senior Member of the IEEE, as well as a member of Sigma Xi, Eta Kappa Nu, and the ASEE.

Abstract: Wireless connectivity is quickly becoming a critical element in future transportation systems, especially with respect to self-driving cars and various levels of vehicular autonomy. Given the complex and highly time-varying environments existing on busy roadways, having each vehicle possessing real-time situational awareness is essential for performing complex functions, such as autonomous lane-changing, traffic intersection management, and platooning. Although there already exists a variety of different sensors that can gather data about the vehicular environment in order to obtain real-time situation awareness, such as LIDAR, RADAR, and vision systems, these sensors can only collect this data via line-of-sight (LOS). On the other hand, wireless connectivity is not constrained to LOS data gathering and can greatly increase the real-time situational awareness of each vehicle on the road, enhancing its performance and increasing driver/passenger safety. As the number of vehicles on the road become connected to each other, this information sharing will evolve into a Vehicular Internet-of-Things (VIOT) environment. To support the VIOT ecosystem, adequate wireless spectrum is needed to enable this connectivity between vehicles in real-time as they are operating on the road in complex conditions. To achieve this, Vehicular Dynamic Spectrum Access, or VDSA, can be employed, where unoccupied wireless spectrum is temporarily accessed by non-licensed users in order to support data communications during that time interval. Compared to conventional DSA techniques, VDSA needs to be capable of handling significant spectral availability variations during a transmission. Past research has explored the use of VDSA in television white space spectral environments as well as the implementation of VDSA algorithms using machine learning techniques. However, recently a new approach to VDSA has been proposed where each vehicle performs VDSA using an algorithm based on bumblebee-inspired resource foraging. In this talk, the fundamentals of how bumblebee-inspired VDSA will be presented, with several examples shown in order to demonstrate the performance of this approach.

Keynotes

Ray Ding, Founder and Chief Executive Office, XCharge Tech
Simon Hou, Co-founder and Chief Operating Officer, XCharge Tech

Title: "The Application of IoT Technologies in the Field of EV Charging"

Ray Ding graduated from Beijing Jiaotong University with a bachelor's degree in Computer Science and Technology. Before founding XCHARGE in 2015, Ray worked as a campaign builder for Google China and as the director of operations for EV Beijing where he organized 4,300+ times test drives and made 2,000+ times EV leasing happen within one month. Recruited as one of the first ten members of Tesla (China), Ray created a record of 98.3% charger installation success rate and launched the "pre-purchase pre-investigation business" in early 2015 which laid the foundation for Tesla's sales business as the Home Charging Project Manager. As founder and CEO of XCHARGE, Ray has been developing company strategy, providing inspiring leadership, leading the R&D team to establish product roadmap, ensuring the company's healthy and sustainable growth, as well as creating a positive and efficient environment. Ray's mission is to make charging services available anywhere and cure range anxiety. Based on 5+ year's experience from the world's largest EV market, Ray has led the XCHARGE crew to develop advanced technology, including XCloud SaaS, V2G and 360 kW ultra-high-power liquid-cooled charger C9LQ.

Simon Hou graduated from the University of Toronto with a bachelor's degree in Business Administration and Management. Before co-founding XCHARGE in 2015, Simon worked on finance and controlling for Mercedes Benz, as a research analyst at McKinsey & Company, before becoming an expert on destination charging at Tesla and later an Associate Manager of Business Development. As Co-founder and COO of XCHARGE, Simon is responsible for strategic planning and global business development. He has rich experience in project management and commercial operation and cooperation of electric vehicle charging. At the same time, he is good at using economic models to solve problems encountered in the operation of electric vehicles and charging facilities, so as to provide a solid landing capability for the smooth commercialization and promotion of XCHARGE. By far, XCHARGE has empowered 300+ charging point operators to deploy over 35,000 chargers in Asia-Pacific and Europe, including 30 provinces in China, Australia, Germany, France, U.K., Belgium, etc., dispensing over 12,000,000 kWh of power per month and serving 120+ EV models.

Abstract: IoT- Internet of Things-is proven on both the vehicle electronic and Consumer electronics industry by its leader, Tesla, and Xiaomi. As an important role in the new energy vehicle ecosystem, EV charging station is welcoming the intelligent trend of IoT as well. Smart charging stations utilizing IOT technologies will enhance the user experience, enable great expansibility to CPO, finally providing an intelligence information port or the entire energy system. Thanks to IoT hardware infrastructure on our smart charging station. We designed an embedded system based on the charging scene, enabling our device to achieve control, interaction, and internet communication functions on a tiny PCB. We also make a reasonable cut to the system and application software to achieve higher efficiency. As the advantages of IoT integration, the simplification of the supply-chain, the reduction of cost, and the reduction of the marginal cost of software also make the profit of charging station providers possible. Finally, we believe that the smart charging station will be used as an infrastructure construction to welcome the new energy era.

VPPC 2020 Program at a Glance

Live Events

Wednesday, November 18		
6:00 - 7:00 EST	Keynote by Nando Ochoa, The University of Melbourne	Title: Making Electric Vehicles and the Grid Work Together
Thursday, November 19		
9:00 - 10:00 EST	Keynote by Jianghua Feng, CRRC Zhuzhou Institute Co. Ltd.	Title: Virtual Rail Intelligent Express System
Friday, November 20		
9:00 - 10:00 EST	Keynote by Alexander Wyglinski, Worcester Polytechnic University	Title: Bumblebee-Inspired Connected Vehicles: What's All The Buzz About
9:00 - 12:00 CET	Workshop by Alain Bouscayrol, Valentin Ivanov, Reinhard Tatschl, and Enric Aramburu	Title: Workshop on Virtual Product Development and Production of All Types of Electrified Vehicles and Components
Saturday, November 21		
9:00 - 10:00 EST	Keynote by Ray Ding & Simon Huo, Xcharge	Title: The Application of IoT Technologies in the Field of EV Charging
Sunday, November 22		
9:00 - 10:00 EST	Keynote by Eric Cheng, The Hong Kong Polytechnic University	Title: Power Electronics Research Development for Energy Storage and Electric Vehicle
Wednesday, November 25		
9:00 - 10:00 EST	Tutorial Q&A via message board with instructors Xuning Feng, Tsinghua University and Jorge Varela Barreras, Imperial College	Title: Understanding the Science and Engineering of Electric Vehicle Battery Safety
Friday, November 27		
9:00 - 10:00 EST	Tutorial Q&A via message board with instructor Francesco Iannuzzo, Aalborg University	Title: SiC Reliability Testing for Automotive and Traction Applications
Wednesday, December 2		
9:00 - 10:00 EST	Tutorial Q&A via message board with instructor David Asean, University of Oviedo	Title: State of Health Determination of Lithium-Ion Batteries: Mechanistic Modeling Approach
Wednesday, December 9		
9:00 - 10:00 EST	Tutorial Q&A via message board with instructors Dragan Zuber, Typhoon Technologies and Philippe Barrade, HES-SO Valais	Title: Real-Time Simulation in the Hardware-in-the-Loop Environments

IEEE VEHICLE POWER AND PROPULSION CONFERENCE PROGRAM

Program at a Glance - Technical Sessions by Session in the Mock Schedule

Session Title	Date in Mock Schedule
Session 1 - Analysis of Transportation Systems	Friday, 20 November
Session 2 - Charging Systems	Wednesday, 18 November
Session 3 - Charging Systems and Infrastructures	Saturday, 21 November
Session 4 - Control of Converters	Thursday, 19 November
Session 5 - Control Systems	Thursday, 19 November
Session 6 - Converters	Wednesday, 18 November
Session 7 - Drives	Wednesday, 18 November
Session 8 - Hydrogen Fueling Infrastructure and Fuel Cell Vehicles	Saturday, 21 November
Session 9 - Lithium Ion Battery Estimation	Wednesday, 18 November
Session 10 - Modeling of Traction Systems	Friday, 20 November
Session 11 - Sensors, Devices and Magnetic Elements	Thursday, 19 November
Session 12 - Smart Transportation Systems	Wednesday, 18 November
Session 13 - Storage Systems	Wednesday, 18 November
Session 14 - Validation Techniques	Friday, 20 November
Session 15 - WBG Devices for Transportation Applications	Wednesday, 18 November
Session 16 - Recent Results	Saturday, 21 November
Session 17 - Special Session 1: Control and Estimation 1	Friday, 20 November
Session 18 - Special Session 1: Control and Estimation 2	Friday, 20 November
Session 19 - Special Session 1: Electric Traction	Thursday, 19 November
Session 20 - Special Session 1: Energy Storage	Friday, 20 November
Session 21 - Special Session 1: Power Conversion 1	Thursday, 19 November
Session 22 - Special Session 1: Power Conversion 2	Thursday, 19 November
Session 23 - Special Session 1: System Analysis	Saturday, 21 November
Session 24 - Special Session: Economics and Decision-making in the Transition to Electric Vehicles	Saturday, 21 November
Session 25 - Special Session: Electric (and Hybrid) Buses	Thursday, 19 November
Session 26 - Special Session: EMR And Other Graphical Descriptions	Saturday, 21 November
Session 27 - Special Session: IEEE VTS Motor Vehicles Challenge 2020 – Energy management of a Fuel cell/ ultracapacitor/battery HEV	Friday, 20 November
Session 28 - Special Session: Multi-level Models for Simulation of Electrified Vehicle	Saturday, 21 November

IEEE VEHICLE POWER AND PROPULSION CONFERENCE PROGRAM	
Program at a Glance - Technical Sessions by Date in the Mock Schedule	
Session Title	**Date in Mock Schedule**
Session 2 - Charging Systems	Wednesday, 18 November
Session 6 - Converters	Wednesday, 18 November
Session 7 - Drives	Wednesday, 18 November
Session 9 - Lithium Ion Battery Estimation	Wednesday, 18 November
Session 12 - Smart Transportation Systems	Wednesday, 18 November
Session 13 - Storage Systems	Wednesday, 18 November
Session 15 - WBG Devices for Transportation Applications	Wednesday, 18 November
Session 4 - Control of Converters	Thursday, 19 November
Session 5 - Control Systems	Thursday, 19 November
Session 11 - Sensors, Devices and Magnetic Elements	Thursday, 19 November
Session 19 - Special Session 1: Electric Traction	Thursday, 19 November
Session 21 - Special Session 1: Power Conversion 1	Thursday, 19 November
Session 22 - Special Session 1: Power Conversion 2	Thursday, 19 November
Session 25 - Special Session: Electric (and Hybrid) Buses	Thursday, 19 November
Session 1 - Analysis of Transportation Systems	Friday, 20 November
Session 10 - Modeling of Traction Systems	Friday, 20 November
Session 14 - Validation Techniques	Friday, 20 November
Session 17 - Special Session 1: Control and Estimation 1	Friday, 20 November
Session 18 - Special Session 1: Control and Estimation 2	Friday, 20 November
Session 20 - Special Session 1: Energy Storage	Friday, 20 November
Session 27 - Special Session: IEEE VTS Motor Vehicles Challenge 2020 – Energy management of a Fuel cell/ ultracapacitor/battery HEV	Friday, 20 November
Session 3 - Charging Systems and Infrastructures	Saturday, 21 November
Session 8 - Hydrogen Fueling Infrastructure and Fuel Cell Vehicles	Saturday, 21 November
Session 16 - Recent Results	Saturday, 21 November
Session 23 - Special Session 1: System Analysis	Saturday, 21 November
Session 24 - Special Session: Economics and Decision-making in the Transition to Electric Vehicles	Saturday, 21 November
Session 26 - Special Session: EMR And Other Graphical Descriptions	Saturday, 21 November
Session 28 - Special Session: Multi-level Models for Simulation of Electrified Vehicle	Saturday, 21 November

IEEE VEHICLE POWER AND PROPULSION

CONFERENCE PROGRAM

18 November (8am EST) to 16 December 2020 (5pm EST)

Session 1 - Analysis of Transportation Systems

Session Co-chairs - Valentin Ivanov and Jose Antonio Aguado

A Method to Predict Propulsion Architecture for Future Jetliners Syed Abu Nahian, WMG, University of Warwick; Andrew McGordon, WMG, Warwick University; Dinh Quang Truong, WMG, University of Warwick	1254158
Different Penetration of Electric Vehicles and Impact on Developments in the Electric Grid Enrico Mancini, michela longo, Federica Foiadelli, Politecnico di Milano; Giovanni, Parrotta; Gabriele Montinaro, Enel Global Infrastructure and Networks	1254490
Fine-tuning a real-time speed planner for eco-driving of connected and automated vehicles Jihun Han, Argonne National Laboratory; Woong Lee, Hanyang University; Dominik A. Karbowski, Aymeric Rousseau, Argonne National Laboratory; Namwook Kim, Hanyang University	1254460
Innovative Train Technologies Energy Comparison on One Non Electrified Railway Clément Dépature, SNCF; Tony Letrouvé, SNCF I&R	1254428
Methodologies for the Synthesis of Reliable MEA Electrical Power System Architectures Angel Recalde, Serhiy Bozhko, Jason Atkin, University of Nottingham	1253872

Session 2 - Charging Systems

Session Co-chairs - Pablo Garcia and Du Jiuyu

Coordinated control of wayside supercapacitor and on-board supercapacitor based on threshold curve optimization in urban rail transit Zhihong Zhong, Fei Lin, Xiaochun Fang, Beijing Jiaotong University; Haikuo Yu, CRRC Qingdao Sifang Rolling Stock Research Institute Co. Ltd.	1254166
Fast Charging Protocols based on Pulse-Modulation with Varying Relaxation for Electric Vehicle Li-ion cells THANNEHENE GEDARA THUSITHA ASELA BANDARA, University of Oviedo, Spain; David Ansean, Juan C. Viera, University of Oviedo, Asturias, Spain; Luciano Sanchez Ramos, Universidad de Oviedo; Manuela González, University of Oviedo, Asturias, Spain	1254172
Simulation on Wireless Power Transfer based Battery Pack Equalization with SOC Quantitative Regulation Jiang Tao, Nanjing university of science and technology; Guang Yang, Harbin Institute of Technology; Yong Tang, Nanjing University of Science & Technology School of Automation; Tang Chuanyu, Wang Tianru, Sun Jinlei, Nanjing University of Science and Technology	1254294
Switching Schemes of the Bidirectional Buck-Boost Converter for Energy Storage System Ramy Georgious, Sarah Saeed, Jorge Garcia, Pablo Garcia, University of Oviedo	1254430
The Influence of High Power Charging on the Lithium Battery Based on Constant and Pulse Current Charging Strategies Jiuyu Du, Tsinghua University	1254214

Session 3 - Charging Systems and Infrastructures

Session Co-chairs - Rui Araujo and Duy-Dinh Nguyen

Multi-Input Multi-Output Model of Airport Infrastructure for Reducing CO2 Emissions Mehmet Cagin Kirca, University of Warwick; Andrew McGordon, WMG, Warwick University; Dinh Quang Truong, WMG, University of Warwick	1253690
Novel Integrated Charger Concept Using an Induction Machine as Transformer at Standstill Erik Hoevenaars, Robert Bosch GmbH; Tobias Illg, Rober Bosch GmbH; Marc Hiller, Karlsruhe Institute of Technology	1253382
On-Board Integrated Battery Charger Using a Nine-Phase FSCW PMSM for an Electric Bus Ruben Aguirre, ikerlan technology research centre; Amaia Lopez-de-Heredia, Ikerlan Technology Research Centre; Irma Villar, Ikerlan; Gaizka Almandoz, Mondragon Unibertsitatea	1254370
Partial Power Processing Based Charging Unit for Electric Vehicle Fast Charging Stations Jon Anzola, Iosu Aizpuru, Asier Arruti, Argiñe Alacano, Ramon Lopez, Mondragon Unibertsitatea; Jesus Sergio Artal-Sevil, Carlos Bernal Ruiz, Universidad de Zaragoza	1253950
Price and Time-Slot Negotiation Protocol for EVs Charging in Highly Congested Distribution Networks Komal Khan, University of Oviedo - LEMUR Research Group; Islam El-Sayed, Pablo Arboleya, University of Oviedo	1254292
Review and Novel Options of Three-Phase Integrated Battery Chargers for EVs Henri Josephson Raherimihaja, Guoqiang Xu, Qianfan Zhang, Harbin Institute of Technology	1253298
Universal Electric Vehicle Charging Infrastructure Analysis Tool Iosu Aizpuru, Asier Arruti, Jon Anzola, Unai Iraola, Mikel Mazuela, Mondragon Unibertsitatea; Alex Rujas, Ikerlan Technology Research Centre	1253416

Session 4 - Control of Converters

Session Co-chairs - Jon Ander Lopez and Z.Q. Zhu

Control of T-type Three-level Bidirectional Hybrid Rectifier Circuit for Electric Vehicle High-power Charging System Jiuyu Du, Haotian Ding, Tsinghua University	1253738
Dual-inverter control synchronization strategy to minimize the DC-link capacitor current Maximilian Schiedermeier, Cornelius Rettner, Friedrich-Alexander-University Erlangen-Nuremberg; Marcel Steiner, OTH Regensburg; Martin März, Friedrich-Alexander-University Erlangen-Nuremberg	1253304
Efficient Small-Signal Algorithm for High Dynamic Phase-Shifted Full-Bridge Converters Martin Baumann, BMW Group; Bert Haj-Ali, Technische Universität München; Christoph Weissinger, BMW Group; Hans-Georg Herzog, Technical University of Munich (TUM)	1253562
Influence of rotor current on noise excitation in electrically-excited synchronous machines Maximilian Martens, Korbinian König-Petermaier, BMW Group	1253678

Session 4 - Control of Converters - Continued

Session Co-chairs - Jon Ander Lopez and Z.Q. Zhu

Nonlinear Control of Dual Half Bridge Converters in Hybrid Energy Storage Systems Ricardo de Castro, German Aerospace Center (DLR); Rui Esteves Araujo, University of Porto, Faculty of Engineering	1254040
Voltage-Scaling of a Phase-Shifted Full-Bridge Converter While Maintaining Dynamic Performance Bert Haj-Ali, Technische Universität München; Martin Baumann, BMW Group; Julian Taube, Technical University of Munich; Christoph Weissinger, BMW Group; Hans-Georg Herzog, Technical University of Munich (TUM)	1253564

Session 5 - Control Systems

Session Co-chairs - Sousso Kelowani and Herschel Pangborn

Effect of Engine Dynamics on Optimal Power-Split Control Strategies in Hybrid Electric Vehicles Anand Ganesan, Chalmers University of Technology; Sébastien Gros, Norwegian University of Science and Technology; Nikolce Murgovski, Chalmers University of Technology; Chih Feng Lee, Volvo Cars; Martin Sivertsson, Volvo Car Corporation	1254450
Integrated Train Trajectory Optimization for An Urban Rail Transit Line based on MILP Miao Zhang, CRRC Zhuzhou Institute Company Limited	1254354
Optimal predictive power management strategy for fuel cell electric vehicles using neural networks in real-time Ahmed Ali, University of Duisburg-Essen; Mostafa I. Yacoub, Military Technical College	1253820
Prognostics-based Energy Management in Fuel Cell Hybrid Electric Vehicle Considering RUL Uncertainty Meiling Yue, University of Franche-Comté; Samir Jemeï, University of Franche Comte; Noureddine Zerhouni, University of Franche-Comte	1254164
Study on Regenerative Braking Control Strategy for Extended Range Electric Vehicles Huang Ying, Beijing Institute of Technology; Yongliang Li, Changlu Zhao, Xu Wang, Fen Guo, Beijing Institute of Tchnology; Long Yang, Beijing Institute of Technology	1253612
The Study for Equivalent Consumption Minimization Strategy Considering Drivability of Parallel HEV Jinho Jang, Hyeongcheol Lee, Hanyang University	1253534
Time-optimal Control Strategies for Electric Race Cars with Different Transmission Technologies Olaf Borsboom, chyannie fahdzyana, Mauro Salazar, Theo Hofman, Eindhoven University of Technology	1253684

Session 6 - Converters

Session Co-chairs - Jesus Doval and Micea Ruba

An Energy Conscious PV Generation and Energy Storage Based Converter for Metro DC Traction Grid Hongbo Li, CRRC Zhuzhou Institute; Chao Zhang, CRRC Zhuzhou Institute Co., Ltd.	1253532
Analytical Equations of the Currents in Dual Active Bridge Converter for More Electric Aircraft Alejandro Fernández, Asier Garcia, Irma Villar, Ikerlan; Gonzalo Abad, Mondragon Unibertsitatea	1254332
Design of a DC/DC Power Converter for Li-ion Battery/Supercapacitor Hybrid Energy Storage System in Electric Vehicles Lakhdar MAMOURI, iCube (UMR CNRS 7357) / L2EP, University of Lille; Tedjani Mesbahi, INSA Strasbourg & ICube laboratory; Patrick BARTHOLOMEUS, Centrale Lille, EA 2697 L2EP; Théophile PAUL, ICube Laboratory (UMR CNRS 7357)	1254274
Partial Power Processing architecture applied to a Battery Energy Storage System Jesus Sergio Artal-Sevil, Carlos Bernal Ruiz, Universidad de Zaragoza; Jon Anzola, Iosu Aizpuru, Mondragon Unibertsitatea; Antonio Bono-Nuez, Jose Miguel Sanz-Alcaine, University of Zaragoza	1254464
Wireless LLC converter for electric bicycle Alberto M. Pernía, University of Oviedo; Miguel J. Prieto, Universidad de Oviedo; Juan Martín Ramos, Pedro J. Villegas, University of Oviedo; Alberto Navarro, Institute of Technology of Castilla y Leon (ITCL); Javier Sedano, Institute of Technology of Castilla y Leon, ITCL	1253274

Session 7 - Drives

Session Co-chairs - Nadir Idir and Philippe Barrade

A Back-EMF Estimation Method for a Switched Reluctance Motor using Model Predictive Control Manuel Pereira, Faculty of Engineering, University of Porto; Pedro Melo, School of Engineering, Polytechnic of Porto; Rui Esteves Araujo, University of Porto, Faculty of Engineering	1254128
A Calibration Strategy for EV Drives Based on Improved MTPV Table Decoupled from Permanent Magnet Flux Linkage Variation Yilin Ma, Zhejiang University; Guangyuan Liu, Leadrive Technology (Shanghai) Co., Ltd; Huan Yang, Zhejiang University; Yufei Dong, Leadrive Technology (Shanghai) Co., Ltd	1253560
An Investigation into Torque Accuracy for a 48V IPMSM under usage of Sensorless Control Christoph Cheshire, Felix Bertele, Tobias Röser, Felix Gliese, Ulrich Ammann, University of Applied Science Esslingen	1254022
Comparison of Fault-tolerant control strategies for a nine-phase IPMSM-FSCW Maitane Carrasco, Amaia Lopez-de-Heredia, Ikerlan Technology Research Centre; Irma Villar, Ikerlan	1254366
Fault-Tolerant Model Predictive Current Control of Five-Phase Permanent Magnet Synchronous Hub Motor Considering Current Constraints Zhou Shi, Xiaodong Sun, Yanling Liu, Weiqi Zhou, Jiangsu University	1254246
Hybrid Propulsion Motor Drives Model based on Multi-level Inverters with Optimised Fuel Economy Jinfeng Li, Imperial College London	1253844

Session 8 - Hydrogen Fueling Infrastructure and Fuel Cell Vehicles

Session Co-chairs - Daniel Hissel and Loic Boulon

Active Thermal Management for an Automotive Water-Cooled Proton Exchange Membrane Fuel Cell by Using Feedback Control Zhang Jin, Beijing Institute of technology; Ya-Xiong Wang, Fuzhou University; Hongwen He, Beijing Institue of Technology; Yao Wang, Beijing Institute of Technology	1254298
Fault tolerant control of a Proton Exchange Membrane Fuel Cell based on a Modified Failure Mode and Effect Analysis AUBRY Julie, Université de Bourgogne Franche Comté; Nadia Steiner, FEMTO-ST; Simon Morando, Symbio Bavans, France; Noureddine Zerhouni, University of Franche-Comte; Daniel Hissel, Université de Bourgogne Franche-Comté, FEMTO-ST , FCLAB,CNRS	1254368
Identification of essential sensors for a PEMFC system in automotive applications Hanqing WANG, FEMTO-ST/FCLAB, UNIVERSITÉ DE TECHNOLOGIE DE BELFORT-MONTBÉLIARD; Simon MORANDO, FAURECIA; Arnaud Gaillard, Univ. Bourgogne Franche-Comte, UTBM; Daniel Hissel, University of Bourgogne Franche-Comté	1254120
Operational cost analysis of fuel cell electric vehicles under different powertrain-sizing configurations Yang Zhou, University of Technology of Belfort Montbeliard, Belfort (France)	1253848
Optimizing Proton Exchange Membrane Fuel Cell manufacturing process to reduce break-in time Fabian Van der Linden, Univ. Bourgogne Franche-Comté FEMTO-ST, FCLAB,CNRS. Symbio, Bavans.; Elodie Pahon, Univ. Bourgogne Franche-Comté FEMTO-ST, FCLAB,CNRS Belfort, France; Simon Morando, Symbio Bavans, France; David Bouquain, Univ. Bourgogne Franche-Comté FEMTO-ST, FCLAB,CNRS Belfort, France	1253272
Optimum Structural Design of Fuel Cell Stacks for Improving the Resistance to Mechanical Shock Hao Dong, Zhang Yanyi, China Automotive Technology and Research Center; Wang Renguang, China Automotive Technology and Research Center Co.,Ltd; Liu Lin, School of Automotive Studies; Hou Yongping, Tongji University	1253268
PEMFC state-of-health estimation using a model-based state Bayesian observer under an automotive load profile Andres Jacome, University of Bourgogne Franche-Comté / CEA Grenoble; Daniel Hissel, University of Bourgogne Franche-Comté; Vincent HEIRIES, Mathias Gerard, CEA	1253320

Session 9 - Lithium Ion Battery Estimation

Session Co-chairs - Marie-Cécile Péra and Manuela González

A data-driven method based on recurrent neural network method for online capacity estimation of lithium-ion batteries Sahar Khaleghi, Vrije Universiteit Brussel; S. Hamidreza Beheshti, Maitane Berecibar, Research group MOBI, Vrije Universiteit Brussel; Joeri Van Mierlo, Vrije Universiteit Brussel	1253260
A novel framework of multi-dimension capacity estimation and fusion for lithium-ion battery Bo Jiang, Haifeng Dai, Tongji University; Wei Jiang, SAIC motor; Fenglai Pei, SMVIC	1253826
Investigation of degradation mechanisms in lithium-ion batteries by incremental open-circuit-voltage characterization and impedance spectra Erik Goldammer, Julia Kowal, Technical University of Berlin	1254098

Session 9 - Lithium Ion Battery Estimation - Continued

Session Co-chairs - Marie-Cécile Péra and Manuela González

Novel Parameter Identification Method for Lithium-Ion Batteries Based on Curve Fitting Milos Lukic, University of Nottingham; Paolo Giangrande, Christian Klumpner, Univeristy of Nottingham; Michael Galea, University of Nottingham Ningbo China	1253626
Online Identification of Battery Internal Resistance under extreme Temperatures Nassim Noura, University of Québec at Trois Rivières	1254414
State-of-Charge Estimation of Lithium-ion Battery Based on a Combined Method of Neural Network and Unscented Kalman filter Seyemehdi Hosseininasab, Zhiwen Wan, RWTH Aachen University	1254296

Session 10 - Modeling of Traction Systems

Session Co-chairs - Paulo Pereirinha and Aymeric Rousseau

Automated Generation of Real Driving Emissions Compliant Drive Cycles Using Conditional Probability Modeling Alexander Wasserburger, Christoph Hametner, TU Wien	1253900
Experimental & Modelling Study of Advanced Direct Coil Cooling Methods in a Switched Reluctance Motor Stephan Schlimpert, Branimir Mrak, Flanders Make, Core Lab MotionS; Steven Vanhee, Dana Incorporated; Ilja Siera, Ruud Sprangers, Punch Powertrain Nederland B.V.; Jasper Nonneman, FlandersMake, Core Lab UGent-EEDT-MP	1254052
Modeling Control and Simulation of a Series Hybrid Propulsion System Davide Tebaldi, Roberto Zanasi, University of Modena and Reggio Emilia	1253746
Scalable Electrical Variable Transmission model for HEV simulations using Energetic Macroscopic Representation Florian Verbelen, Ghent University; Walter Lhomme, Ayoub Aroua, University of Lille; Alain Bouscayrol, Université de Lille; Peter Sergeant, Ghent University, Zwijnaarde (Belgium)	1253940
Transmission Ratio Design for Electric Vehicles via Analytical Modeling and Optimization Theo Hofman, Mauro Salazar, Eindhoven University of Technology	1254420

Session 11 - Sensors, Devices and Magnetic Elements

Session Co-chairs - Juan Diaz and Andrés Barrado Bautista

Estimating the location of plugs in molten-salt pipes Miguel J. Prieto, Universidad de Oviedo	1253598
Thermal Design of a 2-Phase Flow Cooled Medium-frequency 140kVA Transformer for Railway Applications Li Kui, CRRC ZHUZHOU INSTITUE CO.,LTD.; Xiang Xie, Institute for Manufacturing University of Cambridge; Kai He, CRRC ZHUZHOU INSTITUTE CO.,LTD; Lei Yao, Thermal Management Technology Dept.; Zhaozan Feng, Tao Chen, CRRC ZHUZHOU INSTITUTE CO.,LTD	1254182
Simple Equivalent Circuit Capacitance Model for Two-Winding Transformers Christian Østergaard, University of Southern Denmark	1254378

Session 12 - Smart Transportation Systems

Session Co-chairs - Sergio Saponara and Theo Hofman

Adaptive prioritization of a situation-based power management for hybrid electric vehicles Bedatri Moulik, Kausik Bhaumik, Amity University, Noida; Nejra Beganovic, Mid-Sweden University; Ahmed M. Ali, Military Technical College; Dirk Söffker, University of Duisburg-Essen	1254502
Ecological Adaptive Cruise Control for Urban Environments using SPaT Information Sai Krishna, Ankith Purbai, Daniel Görges, Achim Ebert, Roman Teutsch, University of Kaiserslautern	1253588
Learning Based Energy Management Strategy Offline Trainers Comparison for Plug-in Hybrid Electric Buses Jon Ander López-Ibarra, IKERLAN Technology Research Centre; Haizea Gaztañaga, Ikerlan; Yancho Todorov, Mikko Pihlatie, VTT Technical Research Centre of Finland Ltd.	1253250
Mode-switching-based vehicle low-frequency longitudinal vibration control with backlash during Tip-in condition Long Yang, Huang Ying, Beijing Institute of Technology; Guillaume Colin, Univ.Orleans,France	1254024
Powertrain distribution based on total cost of ownership for privately owned vehicles and TNC in the Chicago metropolitan area Vincent Freyermuth, Argonne National Lab	1253542
Transferred Energy Management Strategies for Hybrid Electric Vehicles Based on Driving Conditions Recognition Teng Liu, Xiaolin Tang, Jiaxin Chen, Chongqing University; Hong Wang, Tsinghua University; Wenhao Tan, Yalian Yang, Chongqing University	1253536

Session 13 - Storage Systems

Session Co-chairs - Joao Trovao and Ali Sari

Battery aging test design during first and second life Romain TABUSSE, FEMTO-ST, Univ. Bourgogne Franche-Comté; David Bouquain, Univ. Bourgogne Franche-Comté FEMTO-ST, FCLAB,CNRS Belfort, France; S. Jemei, FEMTO-ST, CNRS, Univ. Franche-comte FCLAB, CNRS; Daniela Chrenko, Femto-ST, CNRS, Univ. Bourgogne Franche-Comte, UTBM	1254282
Characterization of Lithium-Ion Silicon-Graphite 18650 cells under Driving Cycles Jorge Alonso del Valle, Universidad de Oviedo	1254390
Energy Generation with Capacitive DeionizationSystems Daniel del Rivero, University of Oviedo; Miguel J. Prieto, Universidad de Oviedo; Pedro J. Villegas, Juan Martín Ramos, F. Nuño, Alberto M. Pernía, University of Oviedo	1253354
Particle Swarm Optimization of a Fuzzy Controlled Hybrid Energy Storage System - HESS Lenon Diniz Seixas, Federal Technological University of Paraná; Hilkija Gaius Tosso, Federal Technological University of Parana; Jony Javorski Eckert, University of Campinas; Fernanda Cristina Corrêa, Federal Technological University of Paraná - UTFPR	1254446
Sizing and Energy Management Strategy Impact onthe Total Cost of Ownership in Fuel Cell ElectricVehicles Berk Celik, CAPSIM; Andrea Verdicchio, SNCF - Innovation and Research; Tony Letrouvé, SNCF · Innovation and Research	1254454

Session 14 - Validation Techniques

Session Co-chairs - Sylvain Pagerit and Eduardo Pilo

Analysis of Powertrain Efficiency of a Multi-Mode Hybrid Electric Vehicle Based on Operating Modes Woong Lee, Haeseong Jeoung, Hanyang University; Dohyun Park, University of Hanyang; Liyue Yang, Namwook kim, Hanyang University	1253242
Electric city bus performance evaluation by chassis dynamometer measurements Joel Anttila, VTT - Technical Research Centre of Finland; Sai Santhosh Tota, Yancho Todorov, VTT Technical Research Centre of Finland Ltd.	1254386
Hardware in the loop Framework for analysis ofImpact of Electrical Vehicle Charging Devices onDistribution network jovan zelic, Typhoon hil; luka novakovic, typhoon hil; ivana klindo, Typhoon hil; giambattista gruosso, Politecnico di Milano	1253884
Novel Developing Environment for Automated and Electrified Vehicles using Remote and Distributed X-in-the-Loop Technique Viktor Schreiber, Technische Universität Ilmenau	1254560
Ride Blending Control for AWD Electric Vehicle with In-Wheel Motors and Electromagnetic Suspension Valentin Ivanov, Technische Universität Ilmenau	1254206

Session 15 - WBG Devices for Transportation Applications

Session Co-chairs - Ke Li and Kimimori Hamada

Characterization of GaN HEMT Transistors for DC/DC Converters in Transportation Applications Rand AL Mdanat, Ramy Georgious, Jorge Garcia, University of Oviedo; Giulio Dedonato, University of Rome; Fabio Giulii Capponi, University of Rome - La Sapienza	1254478
Design of an integrated GaN inverter into a multiphase PMSM Florentin SALOMEZ, Stéphane Vienot, Bilel Zaidi, Arnaud Videt, Thierry Duquesne, Hugot Pichon, University of Lille; Eric Semail, ENSAM; Nadir Idir, University of Lille	1254470
GaN-based Dc-dc Power Converter for Hybrid Energy Storage System Ander Avila, Ikerlan Technology Research Centre (BRTA); Asier Garcia, Ikerlan; Iñigo Gandiaga, IKERLAN Technology Research Centre; Imir@ikerlan.es, Ikerlan Technology Research Centre (BRTA); Alex Rujas, Ikerlan Technology Research Centre	1254466
Loss analysis and calculation of IPMSM with SiC inverter based on field circuit coupling method Xiaowei Ju, Yuan Cheng, Mingliang Yang, Kai Yao, Ling Ding, Shumei Cui, Harbin Institute of Technology	1254222
Research on the SiC MOSFETs Short Circuit Detection and Protection Optimization Method Baowei Yu, Xizheng Guo, Xucong Bu, Jingjing Wu, Beijing Jiaotong University	1253336
Reviewing of Using Wide-bandgap Power Semiconductor Devices in Electric Vehicle Systems: from Component to System Van Thang Do, University of Sherbrooke; Ke LI, Coventry University; Joao Pedro Trovao, University of Usherbrooke; Loïc BOULON, Université du Québec à Trois-Rivières (Canada)	1254422
Static Current Unbalance of Paralleled SiC MOSFET Modules in the Final Layout Ander Jauregi, Ikerlan Technology Research Centre; David Garrido, Igor Baraia-Etxaburu, Mondragon Unibertsitatea - Faculty of Engineering; Asier Garcia, Ikerlan; Alex Rujas, Ikerlan Technology Research Centre	1254364

Session 16 - Recent Results

Session Co-chairs - Giancarlo Storti and Xiaosong Hu

A unified battery-QZSI model and IMC based dc-link-voltage control for EV applications Hung V. Nguyen, Hanoi University of Science and Technology, Viet Nam; Binh-Minh Nguyen, Toyota Technological Institute, Japan; and Minh C. Ta, Hanoi University of Science and Technology, Viet Nam	1254346
Automatic Conversion of a 3D Thermal Model of a Battery Cell into a 1D Lumped-Element Network Josep Salvador-Iborra, AVL List GmbH, Austria; Juergen Schneider, AVL List GmbH, Austria; and Reinhard Tatschl, AVL List GmbH, Austria	1253284
Examination of Charging Infrastructure for Electric Vehicles Based on Components of Sustainable Business Models Rudolf Schnee, Univ. Bourgogne Franche-Comté, UTBM, CNRS Belfort, France; Daniela Chrenko, Univ. Bourgogne Franche-Comté, UTBM, CNRS, Belfort, France; Peter Neugebauer, Karlsruhe University of Applied Sciences, Karlsruhe, Germany; and Nathalie Kroichvili, Univ. Bourgogne Franche-Comté, UTBM, CNRS, Belfort, France	1253300
Hazard and Risk Analysis on Lithium-based Batteries Oriented to Battery Management System Design David Marcos Guerrero, Ikerlan S.Coop, Spain;Jon Crego, Ikerlan S.Coop, Spain;Maitane Garmendia, Ikerlan S.Coop, Spain; and Jose Antonio Cortajarena, University of the Basque Country (UPV/EHU), Spain	1254244
HIL Simulation of an Electric Race Car with Electric Differential and Regenerative Braking. Andrés Camilo Henao-Muñoz, Coimbra Polytechnic – ISEC, Portugal; Paulo G. Pereirinha, Coimbra Polytechnic – ISEC and INESC Coimbra, Portugal; and Alain Bouscayrol, University of Lille, France	1254406
Interoperability Rating of Wireless Charging Equipment using a Decoupled Impedance Interface Daniel Barth, Karlsruhe Institute of Technology (KIT), Germany;Giuseppe Cortese, Daimler Truck AG, Germany;Ahmed H. Darrat, Mercedes-Benz AG, Germany;Cong Cheng, Karlsruhe Institute of Technology (KIT), Germany;Erik Wöhr, Karlsruhe Institute of Technology (KIT), Germany;Michael R. Suriyah, Karlsruhe Institute of Technology (KIT), Germany; and Thomas Leibfried, Karlsruhe Institute of Technology (KIT), Germany	1253420
Robust Design of Combined Control Strategy for Electric Vehicle with In-wheel Propulsion Marius Heydrich, Technische UniversitÃ¤t Ilmenau, Germany;Vincenzo Ricciardi, Technische UniversitÃ¤t Ilmenau, Germany;Klaus Augsburg, Technische UniversitÃ¤t Ilmenau, Germany; and Valentin Ivanov, Technische UniversitÃ¤t Ilmenau, Germany	1254204
The Mass Transport Analysis of PEMFC Based on Multi-physical Field Fault Model Xuexia Zhang, School of Electrical Engineering, Southwest Jiaotong University, China;Yunkai Zhang, School of Electrical Engineering, Southwest Jiaotong University, China;Yu Jiang, School of Electrical Engineering, Southwest Jiaotong University, China; and Weirong Chen, School of Electrical Engineering, Southwest Jiaotong University, China	1253946

Session 17 - Special Session 1: Control and Estimation 1

Session Co-chairs - Zedong Zheng and Mario Pagano

A multi-view cybersecurity protection framework enabling an attack-resilient TCMS Jun Yang, Yu Wang, Jun Tang, Yan Xiong, Qing Xu, and Qinyang Luo, CRRC Zhuzhou Institute Co., Ltd, China	1256298
A novel text-style sequential modeling method for ultrasonic rail flaw detection Xiao Luo, CRRC Zhuzhou Institute Co., Ltd., China; Yun Qing Hu, CRRC Zhuzhou Institute Co., Ltd., China; Yue Liu, CRRC Zhuzhou Institute Co., Ltd., China; Meng Ying Huang, CRRC Zhuzhou Institute Co., Ltd., China; Wei Chu, CRRC Zhuzhou Institute Co., Ltd., China; and Jun Lin, CRRC Zhuzhou Institute Co., Ltd., China	1254280
Active Guidance of a Railway Running Gear with Independently Rotating Wheels Andreas Heckmann, German Aerospace Center (DLR), Germany;Alexander Keck, German Aerospace Center (DLR), Germany; and Gustav Grether, German Aerospace Center (DLR), Germany	1253584
Energy-meter data validation in railway via physical models Luis Maria ALONSO, Univ. Lille, Arts et Metiers Institute of Technology, Centrale Lille, Yncrea Hautsâ€	1253244
Estimation of Software and Hardware solutions to decrease the overload of the 1.5 kV direct current railway network Andrea VERDICCHIO, SNCF, France; Tony LETROUVE, SNCF, France; and HervÃ© CARON, SNCF RÃ©seau, France	1254350

Session 18 - Special Session 1: Control and Estimation 2

Session Co-chairs - Andrea Mariscotti and Zhongping Yang

End-to-end High-speed Railway Dropper Breakage and Slack Monitoring Based on Computer Vision ShiWang Liu, CRRC Zhuzhou Institute Co., td, China;Yunqing Hu, CRRC Zhuzhou Institute Co., td, China;Jun Lin, CRRC Zhuzhou Institute Co., td, China;Hao Yuan, CRRC Zhuzhou Institute Co., td, China;Qunfang Xiong, CRRC Zhuzhou Institute Co., td, China; and Wei Yue, CRRC Zhuzhou Institute Co., td, China	1253896
Longitudinal control of Autonomous-rail Rapid Tram in platooning using Model Predictive Control yuan xiwen, CRRC Zhuzhou Institute Zhuzhou, China, China	1254306
Low constant speed control of heavy haul electric locomotives based on variable parameter PI Regulator Ke Chen, CRRC TIMES ELECTRIC CO.,LTD., China; Wei Guo, CRRC TIMES ELECTRIC CO.,LTD., China; Weiwei Gan, CRRC TIMES ELECTRIC CO.,LTD., China; Wentao Wang, CRRC TIMES ELECTRIC CO.,LTD., China; and Zhaowen Hou, CRRC TIMES ELECTRIC CO.,LTD., China	1253878
Real-Time Diagnosis of Sensor Fault for Traction Drive System Shaolong Xu, ZhuZhou CRRC Times Electric Co.,Ltd, China;Xueming Li, ZhuZhou CRRC Times Electric Co.,Ltd, China; and Zhiwen Chen, Central South University, China	1253616
State Observation and Parameter Identification for Autonomous Heavy Haul Train Kaibing Du, CRRC ZHUZHOU Institute Co., Ltd, China;Zhanchao Wang, Tsinghua University, China; and Zhengfang Zhang, CRRC ZHUZHOU Institute Co., Ltd, China	1253668

Session 19 - Special Session 1: Electric Traction

Session Co-chairs - Davide Tavernini and Feng Wang

Calculate for Inverter supplied Permanent Magnet Synchronous Motor losses Peng Jun, CRRC	1254216
Experimental Study of the PWM Control Strategy For SiC Traction Inverter of Metro Vehicles Hu Liang, CRRC Zhuzhou Institute Co., Ltd.	1253846
Research on Multi-Vector Cascaded Model Predictive Control of Induction Motors LING FENG, CRRC Zhuzhou	1253880

Session 20 - Special Session 1: Energy Storage

Session Co-chairs - Walter Lhomme and Florian Verbelen

EV Charging Station Integrated with Electric Railway System Powering by Train Regenerative Braking Energy Hamed Jafari Kaleybar, Morris Brenna, Federica Foiadelli, Politecnico di Milano	1254552
Integration of Energy Storage and Renewable Energy Sources into AC Railway System to Reduce Carbon Emission and Energy Cost Nakaret Kano, University of Birmingham; Zhongbei Tian, Birmingham University; Stuart Hillmansen, University of Birmingham	1254240
Optimal Capacity Design of Energy Feedback System in Urban Rail Considering Duty Classes Zhou Ge, Yingbing Yang, Shenzhen Metro Construction Group Co., Ltd; Jian Zhang, Southwest Jiaotong University; Xiaobing Li, Sieyuan Qingneng Electric & Electronics Co., Ltd; Wei Liu, Southwest Jiaotong University; Xianbai Zhan, Shenzhen Metro Operation Group Co., Ltd	1254132
Research on Control Strategy of Urban Rail Energy Feedback System Runze Zhang, CRRC Qingdao Sifang Rolling Stock Research Institute Co., Ltd; Yang Cui, CRRC Qingdao Sifang Rolling Stock Research Institute Co., Ltd.; Wang Hairui, Cao Hu, CRRC Qingdao Sifang Rolling Stock Research Institute Co., Ltd; Yang Peisheng, Hou Fei, JINAN RAIL TRANSIT GROUP CO.,LTD	1254314
Simulation and Test Research of Hydrogen-Powered Tram liangjianying, CRRC Qingdao Sifang Co., Ltd.	1254254
State of Energy Estimation of Lithium-Ion Capacitor for Rail Transit Application Hao Li, Jiuchun Jiang, Zhanguo Wang, Weige Zhang, Fulai An, Xitian He, Beijing Jiaotong University	1253308
Stationary Hybrid Energy Storage System Control Strategy Considering Timetable and Battery Life Yuyan Liu, Beijing Jiaotong University	1254264
Quantitative analysis techniques for evaluating the reliability of Li-ion battery: challenges and solutions Foad H Gandoman, Vrije Universiteit Brussel (VUB)	1254606

Session 21 - Special Session 1: Power Conversion 1

Session Co-chairs - Zedong Zheng and Zhongbei Tian

A Novel Direct Gate Driver for Series-connected SiC MOSFETs Zhe Wang, TsingHua University; Chi Li, Zedong Zheng, Tsinghua University	1254286
Analysis and design of bidirectional isolation converter based on full-bridge CLLC ZHANG Qing, CRRC	1254062
Calculation and Simulation of Propulsion Power Supply System for High-speed Maglev Train Yu Zhang, CRRC Zhuzhou Institute Co., Ltd.	1253852
Design of coupling mechanism for dynamic wireless power transfer system Kai Chen, CRRC Information Technology Co., Ltd.; Hu Cao, Dongyi Li, Meizheng Li, CRRC Qingdao Sifang Rolling Stock Research Institute Co., Ltd.; Yi Wang, School of electrical engineering Beijing Jiaotong University; Jingdong Chen, CRRC Qingdao Sifang Rolling Stock Research Institute Co., Ltd.; YANG PENG, QingDao Sifang Rolling Stock Research Institute Co., Ltd	1254256
Design of Three-Phase Delta-Delta LLC Resonant Converter Jinzhou Cao, Zhuzhou CRRC Times Electrico., Ltd.	1253770
Engineering concerns of optimal realization for a medium frequency transformer in traction power electronic transformers Xuan Guo, Chi Li, Zedong Zheng, Yongdong Li, Tsinghua University	1254284
Failure analysis and optimization design of a cooling fan in auxiliary converter Xuanlin Peng, Zimei Qi, Xionghui Tang, yuyin Li, CRRC Zhuzhou Electric Locomotive Research Institute Co. Ltd	1254136

Session 22 - Special Session 1: Power Conversion 2

Session Co-chairs - Jian-Xin Shen and Foad Heidari

Frequency Adaption Control Strategy for the Power Electronic Traction Transformer Yu Ai, Jianqiang Liu, Jingxi Yang, Trillion Q. Zheng, Beijing Jiaotong University	1253302
Optimal Siting and Sizing for Inverter Feedback Device Applied in Urban Rail Transit Xie Wei, Shenzhen Metro Construction Group Co., Ltd; Ge Tiejun, Shenzhen Metro Operation Group Co., Ltd; Zhang Hao, Southwest Jiaotong University; Li Zhe, Sieyuan Qingneng Electric & Electronics Co., Ltd; Wei Liu, You Li, Southwest Jiaotong University	1254122
Optimization of Railway Operating in terms of Distribution System Voltage Drop Mario Pagano, Luca D'Acierno, Marilisa Botte, Fabio Mottola, University of Naples Federico II	1253700
Research on Control Strategy of Four Quadrant Converter in Urban Rail Bidirectional Substation Guobin Sun, Yang Cui, Hairui Wang, Runze Zhang, CRRC Qingdao Sifang Rolling Stock Research Institute Co., Ltd.; Meng Jia, Xiao Deng, School of electrical engineering Beijing Jiaotong University	1254302

Session 22 - Special Session 1: Power Conversion 2 - Continued

Session Co-chairs - Jian-Xin Shen and Foad Heidari

Research on Output Power Quality and Fault Characteristics of Train Traction Inverter Pankui Yang, CRRC QINGDAO SIFANG CO., LTD; Jianqiang Liu, Hui Dong, Chuanduo Liu, Beijing Jiaotong University; Xiaoyong Li, Bin Jiang, CRRC QINGDAO SIFANG CO., LTD	1253342
The design and selection of DC-link Decoupling Capacitors in Voltage Source Converters of Auxiliary power system jianbo Luo, CRRC ZHUZHOU INSTITUTE	1254318
Transient Simulation and Protection Analysis of Short-circuit Fault on Urban Rail Transit Traction System wang, CRRC QingDao Sifang Rolling Stock Research Institute Co., Ltd.	1254484

Session 23 - Special Session 1: System Analysis

Session Chair - Jon Ander Lopez and Clement Mayet

Calibration set-up for energy measuring systems installed in AC railway systems Jorge Rovira, FFII, Spain	1253524
Discussion of Electrical and Electromagnetic Impact on Environment and Users of Electrified Transports Andrea Mariscotti, University of Genova, Italy	1254312
Effect of The DC Traction Substations No-Load Voltage Set Up Over The System Efficiency Bassam Mohamed, University of Oviedo, Spain;Islam El-Sayed, University of Oviedo, Spain;Pablo Arboleya, University of Oviedo, Spain; and Clément Mayet, Le CNAM Paris, France	1254304
How Pantograph Electric Arcs affect Energy Efficiency in DC Railway Vehicles Andrea Mariscotti, University of Genova, Italy;Antonio Delle Femine, University of Campania, Italy;Daniele Gallo, University of Campania, Italy;Domenico Giordano, INRIM, Italy; and Davide Signorino, INRIM, Italy	1254310
In-depth Life Cycle Cost Analysis of a Li-ion Battery-based Hybrid Diesel-Electric Multiple Unit Josu Olmos, Ikerlan Technology Research Centre, Basque Research and Technology Alliance (BRTA), Spain; Iñigo Gandiaga, Ikerlan Technology Research Centre, Basque Research and Technology Alliance (BRTA), Spain; Dimas Lopez, CAF Power and Automation, Spain; Xabier Larrea, CAF Power and Automation, Spain; Txomin Nieva, CAF Power and Automation, Spain; and Iosu Aizpuru, Mondragon Unibertsitatea, Spain	1253290
Thermal Analysis in Railway Electrification Systems Alejandro Gancedo, CAF Turnkey & Engineering, Spain;Islam El-Sayed, University of Oviedo, Spain;Peru Bidaguren, CAF Turnkey & Engineering, Spain; and Pablo Arboleya, University of Oviedo, Spain	1253246
Web-based Software-Suite for DC Railway Simulation and Analysis: Architecture, Data Management and Visualization Islam El-Sayed, University Of Oviedo, Spain;Bassam Mohamed, University Of Oviedo, Spain; and Pablo Arboleya, University Of Oviedo, Spain	1254426

Session 24 - Special Session: Economics and Decision-making in the Transition to Electric Vehicles

Session Co-chairs - Eric Hittinger and John Paul Helveston

Applying a Detailed Vehicle Model to Techno-Economic Analysis of an Electric Vehicle Anatole Desreveaux, University of Lille, France;Imene Mekki, University of Lille, France;Chelsea Youbi, University of Lille, France;Shiye Zhang, University of Lille, France;Eric Hittinger, University of Lille, France; and Alain Bouscayrol, University of Lille, France	1254458
Economics of Electric Vehicle Charging Infrastructure in a Campus Setting Eric Hittinger, University of Lille, France; Alain Bouscayrol, University of Lille, France; and Elodie Castex, University of Lille, France	1254360
Electrification of Leisure Boats: a commercial State-of-the-Art Mario Porru, University of Cagliari, Italy; Marco Pisano, University of Cagliari, Italy; Alessandro Serpi, University of Cagliari, Italy; and Fabrizio Pilo, University of Cagliari, Italy	1254564
Life-cycle greenhouse gas emissions of alternative and conventional fuel vehicles in India Tapas Peshin, Stanford University, United States;InÃªs Azevedo, Stanford University, United States; and Shayak Sengupta, Carnegie Mellon University, United States	1253702
The electro-mobility Living Lab developped by eCAMPUS EUGENIE MASCLEF, Univ. Lille, UR 4477 TVES - Laboratoire Territoire Ville Environnement & SociÃ©tÃ©, F-59000 Lille, France; ELODIE CASTEX, Univ. Lille, UR 4477 TVES - Laboratoire Territoire Ville Environnement & SociÃ©tÃ©, F-59000 Lille, France; SYLVIE MIAUX, LVC UniversitÃ© du QuÃ©bec Ã Trois-RiviÃ¨res, Canada; ALAIN BOUSCAYROL, Univ. Lille, Arts et MÃ©tiers Paris Tech, Centrale Lille, HEI, EA 2697 L2EP, F-59000 Lille, France; and LOIC BOULON, IRH UniversitÃ© du QuÃ©bec Ã Trois-RiviÃ¨res, Canada	1254358

Session 25 - Special Session: Electric (and Hybrid) Buses

Session Co-chairs - Andoni Saez de Ibarra Ikerlan and Mikko Pihlatie

Charging Management Strategy using ECO-charging for Electric Bus Fleets in Cities Mohammed Mahedi Hasan, Vrije Universiteit Brussel, Belgium;Mikaela Ranta, VTT Technical Research Center, Finland;Mohamed El Baghdadi, Vrije Universiteit Brussel, Belgium; and Omar Hegazy, Vrije Universiteit Brussel, Belgium	1254400
A Framework for Charging Standardisation of Electric Buses in Europe Mehrnaz Farzam Far, VTT, Finland;Marko Paakkinen, VTT, Finland; and Peter Cremers, VDL Bus and Coach bv, Netherlands	1254410
Electric Bus Forward and Backward Models Validation Methodology Based on Dynamometer Tests Measurements Jon Ander Lopez-Ibarra, IKERLAN Technology Research Centre, BRTA, Spain;Joel Anttila, VTT Technical Research Centre of Finland, Finland;Mikaela Ranta, VTT Technical Research Centre of Finland, Finland;Mikko Pihlatie, VTT Technical Research Centre of Finland, Finland; and Haizea GaztaÃ±aga, IKERLAN Technology Research Centre, BRTA, Spain	1254014

Session 25 - Special Session: Electric (and Hybrid) Buses - Continued

Session Co-chairs - Andoni Saez de Ibarra Ikerlan and Mikko Pihlatie

Fuzzy Based Predictive Control For Optimal Energy Management In Hybrid Urban Buses Brishith Falcon Mendoza, Escuela Superior Politecnica de Chimborazo, Ecuador;Victor Herrera Perez, Escuela Superior Politecnica de Chimborazo, Ecuador;Jon Ander Lopez Ibarra, Ikerlan, Spain;Haizea GaztaÃ±aga, Ikerlan, Spain; and Haritza Camblong Ruiz, Universidad del Pais Vasco, Spain	1254210
Genetic Algorithm Control Strategy for Heat Pump System in Battery Electric Buses Rabih Al Haddad, Lebanese American University (LAU), United States; Hussein Basma, PSL Research University - Miness ParisTech - Center for Energy Efficiency of Systems (CES), France; and Charbel Mansour, Lebanese American University (LAU), United States	1253232
Hardware-in-the-Loop Experimental Validation of a Learning based Neuro-Fuzzy Energy Management Strategy for Plug-in Hybrid Electric Buses Jon Ander Lopez-Ibarra, IKERLAN Technology Research Centre, BRTA, Spain; Haizea GaztaÃ±aga, IKERLAN Technology Research Centre, BRTA, Spain; Andoni Saez de Ibarra, IKERLAN Technology Research Centre, BRTA, Spain; and Haritza Camblong, University of the Basque Country, France	1253248
International and European Legislation and Standards for Battery Electric Buses Isabel Carrilero Borbujo, Univ. of Oviedo - Campus Gijon, Spain; Manuela Gonzalez Vega, Univ. of Oviedo - Campus Gijon, Spain; Paulo G. Pereirinha, Polytechnic of Coimbra (IPC-ISEC) / INESC Coimbra, Portugal; David Ansean Gonzalez, Univ. of Oviedo - Campus Gijon, Spain; Jorge Alonso del Valle, Univ. of Oviedo - Campus Gijon, Spain; and Juan Carlos Viera Perez, Univ. of Oviedo - Campus Gijon, Spain	1254438
Optimization of Battery Electric Bus Charging under Varying Operating Conditions Hussein Basma, PSL Research University - Mines ParisTech, France; Charbel Mansour, Lebanese American University, United States; Maroun Nemer, PSL Research University - Mines ParisTech, France; Marc Haddad, Lebanese American University, United States; and Pascal Stabat, PSL Research University - Mines ParisTech, France	1253296

Session 26 - Special Session: EMR And Other

Graphical Descriptions

Session Co-chairs - Minh Ta-Cao and Clement Mayet

Different Voltage and Current Control Schemes for Multi-pack Battery of Electric Scooters Thanh Vo-Duy, Hanoi University of ScienceTechnology, Viet Nam;Minh C.Ta, University of Sherbrooke, Canada;Bá°£o-Huy Nguyá»…n, University of Sherbrooke, Canada;JoÃ£o P. TrovÃ£o, University of Sherbrooke, Canada; and Nguyen NHP, Selex Motors JSC., Viet Nam	1254326

Session 26 - Special Session: EMR And Other Graphical

Descriptions - Continued

Session Co-chairs - Minh Ta-Cao and Clement Mayet

EMR-based Switched Model of DC Railway Systems Supplied by Reversible Traction Power Substations and Regenerative Trains Clement MAYET, Conservatoire National des Arts et Metiers (Le CNAM) - ENS Paris-Saclay, France; Alain BOUSCAYROL, University of Lille, France; Pablo ARBOLEYA, University of Oviedo - Gijon campus, Spain; Philippe DELARUE, University of Lille, France; Bassam MOHAMED, University of Oviedo, Gijon Campus, Spain; and Islam El-Sayed, University of Oviedo, Gijon Campus, Spain	1254252
Energetic simulation of DC railway micro-grid interconnecting with PV solar panels, EV charger infrastructures and electrical railway network Julien Pouget, HEI, HES-SO, Valais, Sion, 1950, Switzerland;Baoling GUO, HEI, HES-SO, Valais, Sion, 1950, Switzerland;Luc Bossoney, HEIG-VD, Yverdon-les-Bains, 1401, Switzerland;Julien Coppex, HEIG-VD, Yverdon-les-Bains, 1401, Switzerland;Dominique Roggo, HEI, HES-SO, Valais, Sion, 1950, Switzerland; and Christoph Ellert, HEI, HES-SO, Valais, Sion, 1950, Switzerland	1254642
Fuel Cell Dual-mode Train: Impact of Charge Depleting Strategy on Hydrogen Consumption Ayoub Aroua, University of Lille, France;Amadou Ball, University of Lille, France;Sabrina Messal, University of Lille, France;Walter Lhomme, University of Lille, France; and Clément Dépature, SNCF, France	1254398
Fuel saving of rear based retrofit hybridization from front based engine vehicle Florian Tournez, L2EP, France; Robin Vincent, Valeo, France; Alain Bouscayrol, L2EP, France; Antoine Richert, Valeo, France; Walter Lhomme, L2EP, France; Mariam Ahmed, Valeo, France; Betty Lemaire-Semail, L2EP, France; and Aurelien Lievre, Valeo, France	1254416
Mechanical Braking Strategy Impact on Energy Consumption of a Subway Ryan O Berriel, L2EP - University of Lille, France;Alain Bouscayrol, L2EP - University of Lille, France;Philippe Delarue, L2EP - University of Lille, France; and Charles Brocart, Métropole Européenne de Lille (MEL), France	1254392
Power-Oriented Modeling of Epicyclic Gear Trains Roberto Zanasi, University of ModenaReggio Emilia, Italy; and Davide Tebaldi, University of Modena and Reggio Emilia, Italy	1253744
Virtual Power Plant integration and test bench for railway Smart Grid applied to stationary Energy Storage Systems and Stations Tony LETROUVE, SNCF, France; and Rudy CHAUMONT, SNCF, France	1254348

Session 27 - Special Session: IEEE VTS Motor Vehicles Challenge 2020 – Energy management of a Fuel cell/ultracapacitor/battery HEV

Session Co-chairs - Javier Solano and Bao Huy Nguyen

An MPC-based Energy Management System for a Hybrid Electric Vehicle Alessandro Serpi, University of Cagliari, Italy; and Mario Porru, University of Cagliari, Italy	1254436
Energy Management Strategy for a Fuel cell/Lead acid battery/ Ultracapacitor hybrid electric vehicle Silvia Colnago, Politecnico di Milano, Italy;Marco Mauri, Politecnico di Milano, Italy; and Luigi Piegari, Politecnico di Milano, Italy	1254220
Energy Managment System Designed for Reducing Operational Costs of a Hybrid Fuel Cell-Battery-Ultracapacitor Vehicle Eduardo Gaston Amaya, Universidad Nacional de San Luis (UNSL), Argentina; Hector Gerardo Chiacchiarini, Instituto de Inv. en Ing. Electrica, Argentina; and Cristian Hernan De Angelo, Instituto de Investigaciones en Tecnologias Energeticas y Materiales Avanzados (IITEMA) - UNRC - CONICET, Argentina	1253538
IEEE VTS Motor Vehicles Challenge 2021 - Energy Management of A Dual-Motor All-Wheel Drive Electric Vehicle Bao-Huy Nguyen, Universitat de Sherbrooke, Canada; Joao Pedro Trovao, UniversitÃ© de Sherbrooke, Canada; Samir Jemei, Univ. Bourgogne Franche-ComtÃ©, France; Loic Boulon, UniversitÃ© du QuÃ©bec Ã Trois-RiviÃ¨res, Canada; and Alain Bouscayrol, UniversitÃ© de Lille, France	1254424
Rule-Based Energy Management Strategy of Fuel Cell/Ultracapacitor/Battery Vehicles: winner of the IEEE VTS Motor Vehicles Challenge 2020 Alessandro Ferrara, TU Wien, Austria; and Christoph Hametner, TU Wien, Austria	1253856
Sizing of renewable energy and storage resources in railway substations according to load shaving level Berk Celik, CAPSIM, France;Andrea Verdicchio, SNCF, France; and Tony Letrouve, SNCF, France	1254418

Session 28 - Special Session: Multi-level Models for Simulation of Electrified Vehicle

Session Co-chairs - Ronan German and Calin Husar

Comparison of equivalent circuit battery models for energetic studies on electric vehicles David Ramsey, University of Lille, France; Ronan German, University of Lille, France; Alain Bouscayrol, University of Lille, France; and Loic Boulon, University of Quebec a Trois-Rivieres, Canada	1254144
Comparison of two levels of cell models for an EV current cycle Ronan German, Univ. Lille, France; Joris Jaguemont, Vrije Universiteit Brussel, Belgium; and Alain Bouscayrol, Univ. Lille, France	1254376
EMR Modeling of Mobypost Daniela Chrenko, Univ. Bourgogne Franche-Comte, France; and Loic Vichard, Univ. Bourgogne Franche-Comte, France	1254260

Session 28 - Special Session: Multi-level Models for Simulation of Electrified Vehicle - Continued

Session Co-chairs - Ronan German and Calin Husar

Energetic Macroscopic Representation of Scalable PMSM for Electric Vehicles Walter Lhomme, University of Lille, France; Florian Verbelen, Ghent University, Belgium; Mohamed N. Ibrahim, Ghent University, Belgium; and Kurt Stockman, Ghent University, Belgium	1253862
Multi-level simulation of a BEV using EMR methodology Calin Husar, Siemens Industry Software, Romania;Edis Eduard Raclaru, Siemens Industry Software, Romania;Cristi Irimia, Siemens Industry Software, Romania;Mihail Grovu, Siemens Industry Software, Romania;Matthieu Ponchant, Siemens Industry Software, Romania;Joris Jaguemont, VUB, Belgium;Alain Bouscayrol, Univ. Lille, France;Ronan German, Univ. Lille, France;Mircea Ruba, Technical University of Cluj Napoca, Romania;Claudia Martis, Technical University of Cluj Napoca, Romania; and Gabriel Mihai Sirbu, Renault Technologie Roumanie, Romania	1254544

A SECOND CHANCE TO SEE SPAIN!

IEEE-VPPC 2021

IEEE Vehicle Power and Propulsion Conference

Will again, be held in **Gijón, Spain**

For additional information:
events.vtsociety.org/vppc2021/

IEEE VTS

Connecting the Mobile World

VPPC 2020

VPPC 2020

Connecting Green e-Motion

18 NOVEMBER TO 16 DECEMBER, 2020 | GIJÓN, SPAIN

Front Cover Designed by:

Conference Catalysts