ITEC-AP2023

2023 IEEE Transportation Electrification Conference and Expo, Asia-Pacific

Nov 28 – Dec 1, 2023
Chiang Mai, Thailand

https://itec-ap2023.com

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IEEE TRANSPORTATION ELECTRIFICATION COMMUNITY
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IEEE PES Power & Energy Society®

Center of Excellence in Electrical Power Technology
Faculty of Engineering, Chulalongkorn University
ELECTRICAL ENGINEERING

IEEE Joint IAS/IES/PELS Thailand Chapter (IE13/IA34/PEL35)

ITEC 2023 Asia-Pacific

PEA VOLTA

PROVINCIAL ELECTRICITY AUTHORITY (PEA) HAS DEVELOPED AN ELECTRIC VEHICLE (EV) CHARGING BUSINESS CALLED "PEA VOLTA" WITH A DEDICATION TO PROMOTING THE CONTINUOUS GROWTH OF THE EV MARKET AND SUPPORTING USERS' CONFIDENCE IN USING EVS THROUGHOUT THE COUNTRY.

EV CHARGING STATION

CHARGER TYPES

- AC TYPE 2 (43 KW),
- DC CHADEMO (50 KW)
- CCS2 (25 KW, 50 KW, 120 KW, 300 KW AND 360 KW)

PLANS TO EXTEND THE CHARGING STATION'S COVERAGE TO 413 EV STATIONS AND 75 PROVINCES BY 2023.

MOBILE APPLICATION

- FIND NEARBY STATIONS.
- NAVIGATE TO THE STATION WITH GPS.
- CHECK THE STATUS OF ALL STATIONS.
- EASILY START/STOP THE CHARGING PROCESS.
- CONVENIENTLY MAKE PAYMENTS.
- VIEW THE USAGE HISTORY.

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KEY FEATURES OF VOLTA CONNEXT FOR PARTNER

- **VOLTA CONNEXT** : DISPLAY THE PARTNER STATION'S LOCATION ON PEA VOLTA APPLICATION.
- **STATION MANAGEMENT :** FACILITATE THE OPERATION PROCESS.
- **SERVICE FEE COLLECTING AND BILLING** : STRATEGIZE BUSINESS EFFECTIVELY.
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OVERVIEW

Title: 2023 IEEE Transportation Electrification Conference and Expo, Asia-Pacific (ITEC-AP 2023)

Date: November 28 – December 1, 2023

Venue: Chiangmai Grandview Hotel & Convention Center
Chiang Mai, Thailand

Highlight

- 4 Keynote Speakers
- 3 Tutorial Speakers
- 2 Plenary Speakers
- 1 Panel Session
- 34 Sessions
- 122 Oral Presentations
- 47 Poster Presentations
- 19 Industry Presentations

Past Conference

ITEC-AP2023	Nov 28 – Dec 1	Chiang Mai, Thailand
ITEC-AP2022	Oct 28 – Oct 31	Zhejiang, China
ITEC-AP2019	May 8 – May 10	Jeju, South Korea
ITEC-AP2018	Jun 6 – Jun 9	Bangkok, Thailand
ITEC-AP2017	Aug 2 – Aug 5	Harbin, China
ITEC-AP2016	Jun 1 – Jun 4	Busan, South Korea
ITEC-AP2014	Aug 31 – Sep 3	Beijing, China

STATEMENT FROM GENERAL CHAIRMAN

Home to 60% of the world's total population and 70% of the world's populous cities, Asia-Pacific continues to experience rapid growth in urbanization. Nevertheless, the acceleration of industrialization and urbanization, energy and environmental issues that seriously affects human survival and development have become the focus of the entire world. Among various kind of energy and environmental issues, air pollution is of the most public concern.

Given the above situation, finding a feasible approach to alleviate the air pollution carries enormous significance. In the transport sector, the use of renewable energies and electric vehicles (EVs) are being emphasized to tackle the energy and environmental issues. At the COP26 in Glasgow, Thailand brought the "Bio-Circular-Green" or BCG economic model, and reiterated that the country will be the pathway towards a paradigm shift to environmentally friendly economic development.

For Thailand and all nations, the importance of researching and knowledge sharing play vital roles to support the electrification revolution across the BCG economic model, including EV cars, electric ships and aircraft, rail systems, personal transport, storage, power grid, power electronics, electronic intelligence, and etc. With the supports of the IEEE Industry Applications Society, the IEEE Power Electronics Society, the IEEE Power and Energy Society and the IEEE Transportation Electrification Community to coordinate numerous activities, including the upcoming ITEC Asia-Pacific 2023 which will be held in Chiangmai during 28th Nov – 1st Dec 2023, we're able to provide a key platform for academic paper presentation on many fascinating topics. In addition, there'll be keynote speakers to talk about the role of motor drives and control in transportation electrification, electromagnetic vibration of electrical machines, theoretical analysis and optimal design, electrical power and propulsion and panel discussion on EV battery Reuse and Recycling as well.

We believe in new business models and future careers in the manufacturing of electric vehicles and the related EV ecosystem thus we support technological and knowledge sharing platforms, from professional levels to student levels in all educational backgrounds.

We support the shift towards clean energy thus academic events are seen as highly important knowledge sharing platform for everyone in the industry and in educational institutions, to exchange our know-hows, hypothesis, inventions and viewpoints for on-going development in the new era of carbon-neutrality technology.

On behalf of the iTEC Asia-Pacific 2023 organizing committee, it's our great pleasure in co-organizing this key event in Chiangmai, Thailand. At the same time, we would like to take this opportunity to welcome all delegates and participants at the iTEC-AP 2023, which I'm confidence that your participation and information exchange will contribute to the development of future mobility through bio-circular-green economy within Aisa-Pacific Economic Cooperation (APEC) and the world.

Krisda Utamote
iTEC-AP 2023 General Chairman

STATEMENT FROM ORGANIZER - CEPT

As we are all entering an era of power and energy transition toward carbon neutrality for a sustainable future, there are many major issues that we need to get through in order to achieve this goal. A significant integration of variable renewable energy sources such as wind and solar especially in close proximity to consumers' end (e.g. rooftop solar) has caused a paradigm shift not only in changing from centralized to decentralized operations of power grid, but also in changing from highly controllable to rarely controllable power generations due to an intermittency created by wind and solar power outputs. Furthermore, an explosion of electric vehicle (EV) growth tremendously signifies a sector coupling of the transport and energy sectors. EVs require electricity for their fuel. Therefore, the integration of EVs into power grid, if unmanaged, could adversely increase peak demand triggering significant grid infrastructure upgrades for accommodating more EV penetration. These integration trends collectively pose substantial challenges to power utilities.

From power industry standpoint, an increasing penetration of variable renewable energies inevitably needs more energy storage to firm up power generation resources, while a rising penetration of EVs driven from automotive industry offers abundance of usable energy storage. Consequently, monetization of storage (battery) is a win-win opportunity to unlock the potential and value of the automotive and power industries, enabling the world to smoothly drive toward the carbon neutrality and energy sustainability goals. To this end, advanced EV charging technologies such as smart charging, on-board bi-directional charging along with appropriate policies and incentives enable EVs to synergize and support the power grid. In other words, EVs are capable of serving as distributed energy resources (DER) that can be the key player in driving the future power grid.

Hence, it is our motivation and our role as the Center of Excellence in Electrical Power Technology (CEPT) to honorably and enthusiastically take part in organizing this 2023 IEEE Transportation Electrification Conference and Expo, Asia-Pacific (ITEC-AP 2023). We wish to take this opportunity to strengthen a collaboration between automotive and power industries along with academia so that we can have a common understanding and be on the same page regarding the global issues we need to overcome, in order to steer an integrated ecosystem of technologies for supporting our ambitious energy sustainability goal.

It is our great honor and pleasure to welcome all delegates and participants to the ITEC-AP 2023 in Chiang Mai, Thailand. We wish that knowledge and information exchanges among academic and industries occurring at the ITEC-AP 2023 can leverage a tighter integration of the automotive and power industries working hand in hand to navigate the sustainable energy future together.

ELECTRICAL ENGINEERING
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HIGHLIGHT FEATURES

Driving Automation Systems

Advance Driver Assistance Systems (ADAS) and Automated Driving Systems (ADS)

End-to-end solution for develping safe automated vehicles

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SMART TAGGING

Artificial Intelligence Technology for Road Safety

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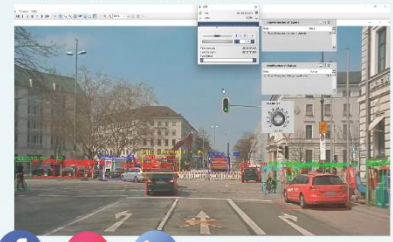

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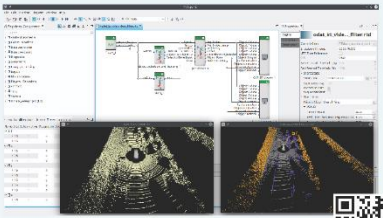

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STATEMENT FROM ACTING PRESIDENT OF RMUTL

On behalf of Rajamangala University of Technology Lanna, it is my absolute pleasure to welcome you to the 2023 IEEE Transportation Electrification Conference and Expo, Asia-Pacific (ITEC Asia-Pacific 2023), co-organized with the Center of Excellence in Electrical Power Technology (CEPT) and Chulalongkorn University. The conference is hosted Chiang Mai, Thailand, from 28th November to 1st December 2023. This conference aims to be a momentous event, marking significant advancements in the field of transportation electrification.

As a university dedicated to fostering innovation within the community, at RMUTL, we perceive this conference as a perfect opportunity to both contribute our knowledge and learn from the expertise gathered from across the globe. By engaging with your insights, we aim to further refine our ability to produce exceptional hands-on graduates. The essence of the IEEE ITEC series lies in its vital role in fostering collaboration and knowledge-sharing within the field of electrical technologies for transportation. As we gather for ITEC Asia-Pacific, we aim to create a forum for the exchange of innovative ideas, experiences, and cutting-edge research. With a comprehensive program that includes technical sessions, tutorials, and engaging industry activities, this conference stands as a proof to the rapid change being made in the field of e-mobility, electric vehicles, power electronics, energy storage systems, and many more.

With the support of leading organizations as the IEEE Industrial Applications Society (IAS), the IEEE Power and Energy Society (PES), the IEEE Power Electronics Society (PELS), and the IEEE Transportation Electrification Community (TEC), this event shows our shared commitment to advancing the use of electrical technologies in transportation. I also would like to extend my heartfelt gratitude to the IEEE Joint IAS/IES/PELS Thailand Chapter and the Electric Vehicle Association of Thailand (EVAT) for their valuable technical collaboration, which has significantly enriched the program of ITEC Asia-Pacific 2023.

With a compelling lineup of presentations covering a wide range of topics in transportation electrification, ranging from powertrain design and battery energy storage systems to charging infrastructure and standards, I am confident that ITEC Asia-Pacific 2023 will serve as a positive force for driving innovation and sustainable progress within the global transportation electrification landscape.

I look forward to your active participation and meaningful contributions, and to witnessing the exchange of transformative ideas that will shape the future of transportation electrification. I also invite you to enjoy the vibrant atmosphere of Chiang Mai in this perfect time of the year, which offers stunning natural beauty and a wealth of culturally rich festivals, such as the Loy Kratong festival, which I highly recommend you experience.

May this conference be a success, and I hope each of you enjoy the delightful experiences Chiang Mai has to offer.

Asst. Prof. Dr. Jutturit Thongpron
Acting President of Rajamangala
University of Technology Lanna

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Program At a Glance

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Industry Presentations [1,19]</td><td>Academic Oral Presentations
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Industry Presentations
Academic Poster Presentations [P1-15]
[IND2-6]</td><td>Academic Oral Presentations
[OS46-75]
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28 November 2023

09.00 - 17.00	Registration
13.00 - 13.40	Keynote Speaker [1] **Dr. Amit K. Gupta** at **CGV 1** **Topic: Electrical Power and Propulsion**
13.40 - 14.20	Tutorial Speaker [1] **Dr. Ronghai Qu** at **CGV 1** Topic: **Hair-pin Winding Permanent Magnet Machines**
14.20 - 15.00	Tutorial Speaker [2] **Prof. Dr. Noureddine TAKORABET** at **CGV 1** Topic: **About Fast and Easy Modelling for the Design of Electrical Machines**
15.00 - 15.20	Coffee Break
15.20 - 16.00	Tutorial Speaker [3] **Mr. Justus Voigt** at **CGV 1** Topic: **Real-Time Electric Drive Simulation Approaches and Testing and Validation of Inverter ECUs on High Voltage Level**
16.00-16.40	Industry Presentation, Session 28IND1: [IND1] **Mr. Chien Ming Wu, INFORMATIC PTE. LTD., Singapore** at **CGV 1** Topic: **Enhancing Academic Teaching of Power Electronics through Real-Time Simulation**
16.40-17.20	Industry Presentation, Session 28IND1: [IND19] **Mr. Tushit Desai, Ansys Inc.** at **CGV 1** Topic: **Pervasive Simulation for Automotive Electrification**
18.00 - 22.00	Welcome Reception at **Thippiman**, 2nd floor, Hotel Building

29 November 2023

09.00 - 09.30	Open Ceremony at **CGV 1**				
09.30 - 10.15	Keynote Speaker [2] **Prof. Dr. Chris Mi** at **CGV 1** Topic: **Reuse and Recycling of EV batteries**				
10.15 - 10.30	Coffee Break				
10.30 - 11.15	Plenary Speaker [1] **Prof. Dr. Surin Khomfoi** at **CGV 1** Topic: **An ANN-based technique for Assessing Lithium-Ion Battery Health in Electric Vehicles applied in PEA-VOLTA Planform**				
11.15 - 12.00	Keynote Speaker [3] **Prof. Dr. Babak Nahid-Mobarakeh** at **CGV 1** Topic: **Role of Motor Drives and Control in Transportation Electrification**				
12.00 - 13.00	Lunch at **Chang Plai**, 1st floor, Convention Building				
13.00 - 14.40	**Academic Oral Sessions**				**Industry Presentations** (13.00-16.20)
Room	**CGV 2**	**CGV 3**	**CGV 4**	**PT 1**	**CGV 1**
Session	29OS1	29OS2	29OS3	29OL1	29IND1
Paper No.	OS1-OS5	OS6-OS10	OS11-OS15	OL1-OL5	[IND2]-[IND6]
14.40 - 14.50	Coffee Break				
14.50 - 16.30	**Academic Oral Sessions**				**Academic Poster**
Room	**CGV 2**	**CGV 3**	**CGV 4**	**PT 1**	**Exhibition Hall 1**
Session	29OS4	29OS5	29OS6	29OL2	29OSP
Paper No.	OS16-OS20	OS21-OS25	OS26-OS30	OL6-OL10	P1-P15
16.30 - 17.45	Panel Session at **CGV 1** Topic: **Panel on EV Battery Reuse and Recycling**				

30 November 2023

09.00 - 09.40	Keynote Speaker [4] **Prof. Dr. Jian-Xin Shen** at **CGV 1** **Topic: Electromagnetic Vibration of Electrical Machines – Theoretical Analysis and Optimal Design**				
09.40 - 10.20	Plenary Speaker [2] **Dr. Vincent LECONTE**, **Altair** at **CGV 1** Topic: **Advanced Multiphysics Optimization Techniques For Electric Motor Design**				
10.20 - 10.30	Coffee Break				
10.30 - 12.10	**Academic Oral Sessions**				**Industry Presentations** (10.30 - 11.50)
Room	**CGV 2**	**CGV 3**	**CGV 4**	**PT 1**	**CGV 1**
Session	30OS1	30OS2	30OS3	30OL1	30IND1
Paper No.	OS31-OS35	OS36-OS40	OS41-OS45	OL11-OL15	[IND7]-[IND8]
12.10 - 13.00	Lunch at **Chang Plai**, 1st floor, Convention Building				
13.00 - 14.40	**Academic Oral Sessions**				**Industry Presentations** (13.00 - 17.00)
Room	**CGV 2**	**CGV 3**	**CGV 4**	**PT 1**	**CGV 1**
Session	30OS4	30OS5	30OS6	30OL2	30IND2
Paper No.	OS46-OS50	OS51-OS55	OS56-OS60	OL16-OL20	[IND9]-[IND14]
14.40 - 14.50	Coffee Break				
14.50 - 16.30	**Academic Oral Sessions**				**Academic Poster Session**
Room	**CGV 2**	**CGV 3**	**CGV 4**	**PT 1**	**Exhibition Hall 1**
Session	30OS7	30OS8	30OS9	30OL3	30OSP
Paper No.	OS61-OS65	OS66-OS70	OS71-OS75	OL21-OL25	P16-P30
18.00 - 22.00	Networking Banquet at **Thippiman**, 2nd floor, Hotel Building				

01 December 2023

09.00 - 10.40	**Academic Oral Sessions**				**Academic Poster Session**	**Industry Presentations** (09.00 - 11.40)
Room	**CGV 2**	**CGV 3**	**CGV 4**	**PT 1**	**Exhibition Hall 1**	**CGV 1**
Session	01OS1	01OS2	01OL3	01OL1	01OSP	01IND1
Paper No.	OS76-OS78	OS79-OS82, OS86	OL36-OL38	OL26-OL30	P31-P47	
10.40 - 10.50	Coffee Break					
10.50 - 12.30	**Academic Oral Sessions**					[IND15]-[IND18]
Room	**CGV 2**	[redacted]		**PT 1**		
Session	01OS3			01OL2		
Paper No.	OS83-OS85			OL31-OL35		
12.30-13.30	Lunch at **Chang Plai**, 1st floor, Convention Building					

VENUE

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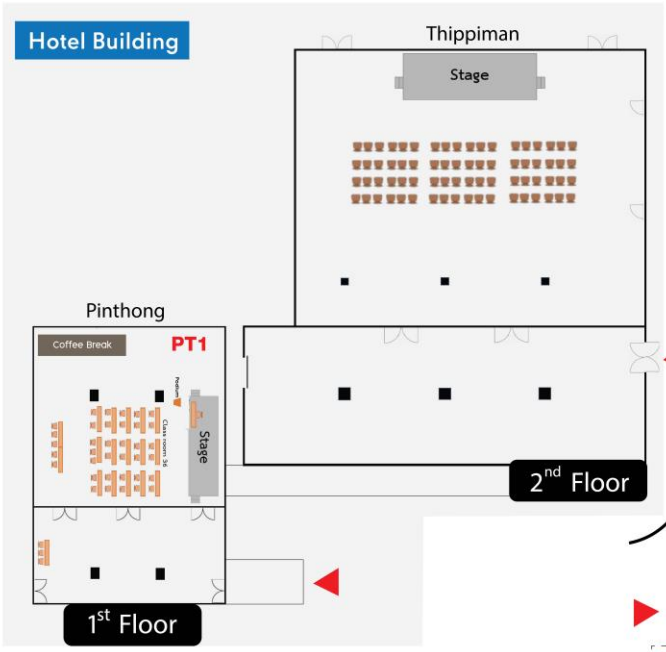
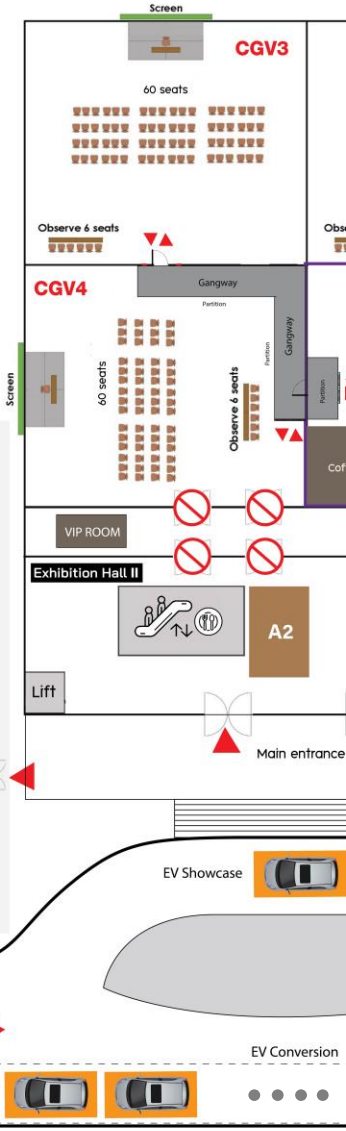
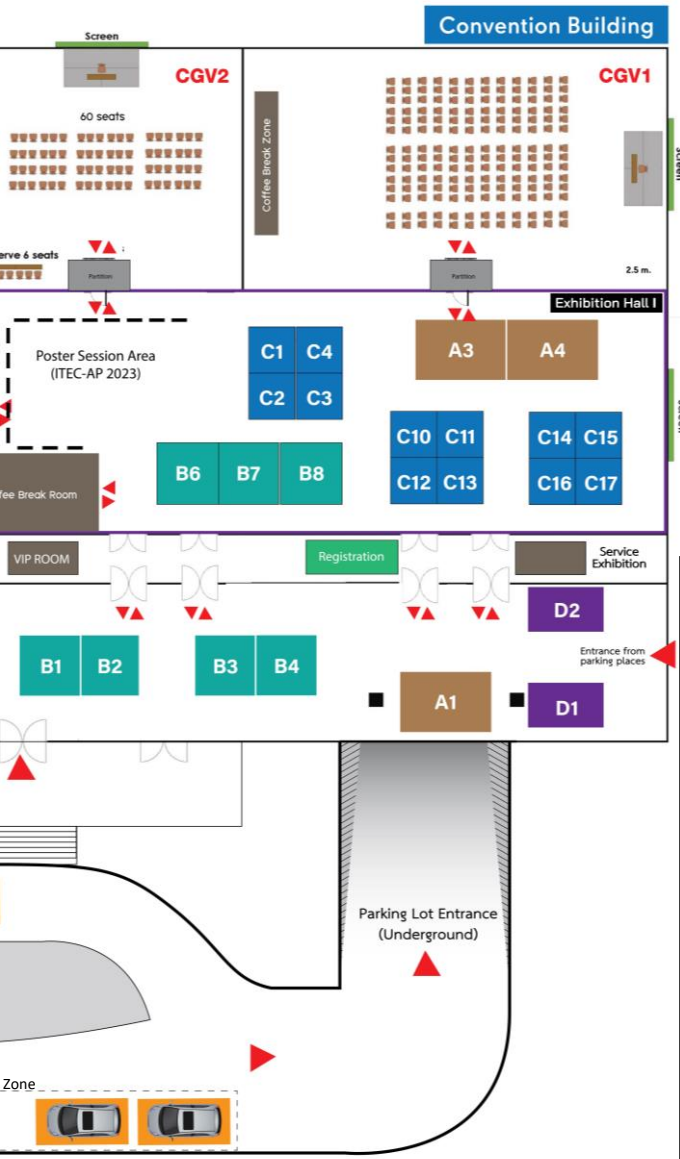
Website: http://www.chiangmaigrandview.com/







BOOTH	COMPANY
A1	Provincial Electricity Authority (PEA)
A2	NETA Auto (Thailand) Co.,Ltd.
A3	CTA Engineering Co.,Ltd.
A4	dSPACE / P.G. Intergroup Co., Ltd.
B1	Dassault Systemes
B2	FES Co., Ltd.
B3	Altair Engineering Sdn. Bhd.
B4	Genetron Technology (Thailand) Co., Ltd.
B6 - B8	CU + Sigma + Hexagon
C1, C4	Delta Electronics (Thailand) PCL.
C2	Wurth Electronics Singapore Pte.Ltd.
C3	Quantel Global Co., Ltd.
C10	Ansys Inc.
C11	YOKOGAWA (Thailand)
C12	EA Elektro-Automatik GmbH & Co.KG
C13	HIOKI Singapore Pte., Ltd.
C14	Infomatic Pte., Ltd.
C15	ECUTEC
C16	iRC Technologies Limited
C17	FES Co., Ltd.
D1	PTR SMARTTECH Co., Ltd.
D2	Rajamangala University of Technology Lanna
EV	NETA Auto (Thailand) Co.,Ltd.
EV Con1	NimSeeseng Transport 1988 Co., Ltd.
EV Con2	ECUTEC
EV Con3	WPEV Co., Ltd.

PRESENTER GUILDLINE

Oral / Special Session

- Presentation time: 15 minutes presentation + 5 minutes live Q&A
- Please arrive in the session / online room at least 15 minutes before the session starts to check your presentation materials.
- Prepare your presentation files in both .ppt and .pdf format (to avoid technical problems such as missing fonts).
- Presentations are to be done on the laptop provided at the event. Please prepare a USB stick for transferring your presentation files to the laptop.

Online Session

- Presentation time: 15 minutes presentation + 5 minutes live Q&A
- Given Zoom livestreaming, please access Zoom at least 15 minutes before the session starts to check your presentation materials including the internet connection.
- To ensure undisrupted presentation, please prepare a backup internet connection (such as 4G mobile hotspot) in case your main internet connection goes down.
- Online attendants can join the presentation via Zoom.
- Your presentation will be also mirrored to the projector in the session room for on-site attendants.

Poster Session

- All the posters will be displayed all day long as part of the exhibition gallery in the Exhibition Room for public viewing.
  However, the presenters are responsible to show up and present their posters during the assigned schedule only (as indicated in the conference program).
- No audiovisual equipment is permitted for poster presentations.
- If you choose to bring handouts or copies of your poster to distribute to poster session attendees, we recommend you bring approximately 100 copies and provide contact information (i.e., author names and email addresses) on the handout.
- Each presenter is allowed one poster and each poster will have its own poster stand.
- If the presenters wish to collect their posters back (dismantle), this can be done after 18:00 of that presentation day.

** No Camera & No Record **

Please note that photo taking and video recording are strictly prohibited for legal reasons, such as copyright and portrait rights.

ASSISTANCE

Need Help?

- **In-person (On-site):** Registration Desk or iTEC-AP23 staff throughout venue.
- **Online:** Contact via email [somnuek@rmutl.ac.th]

Emergency Call

In case of emergency, you should use the telephone number **1669** to call an ambulance. You also can call the police with the telephone number **191**. All emergency calls are free from any device.

Place You Should Know

Registration Desk:	Exhibition Foyer
Exhibition Service:	Exhibition Foyer
Highlighted Session Room:	CGV1
Coffee Break Zone:	Exhibition Hall I, CGV1, PT1
Launch Room:	Chang Plai (1st floor, Convention Building)
Banquet Room:	Thippiman (2nd floor, Hotel Building)

Badges

All conference delegates are required to wear badges all the time for access in conference area, which they will receive when they register. These badges will indicate the type of registration each delegate has.

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KEYNOTE SPEAKERS

Keynote 1: Electrical Power and Propulsion.

Amit K. Gupta
Rolls-Royce Electrical, Singapore
Nanyang Technological University, Singapore

- Date & Time: 28 NOV 2023, 13.00 – 13.40
- Room: CGV1

Keynote 2: Reuse and Recycling of EV batteries.

Chris Mi
San Diego State University, USA

- Date & Time: 29 NOV 2023, 09.30 – 10.15
- Room: CGV1

Keynote 3: Role of Motor Drives and Control in Transportation Electrification.

Babak Nahid-Mobarakeh
McMaster University, Canada

- Date & Time: 29 NOV 2023, 11.15 – 12.00
- Room: CGV1

Keynote 4: Electromagnetic Vibration of Electrical Machines – Theoretical Analysis and Optimal Design.

Jian-Xin Shen
Zhejiang University, China

- Date & Time: 30 NOV 2023, 09.00 – 09.40
- Room: CGV1

TUTORIAL SPEAKERS

Tutorial 1: Hair-pin Winding Permanent Magnet Machines.

Ronghai Qu
Huazhong University of Science & Technology, China

- Date & Time: 28 NOV 2023, 13.40 – 14.20
- Room: CGV1

Tutorial 2: About Fast and Easy Modelling for the Design of Electrical Machines.

Noureddine TAKORABET
Université de Lorraine, France

- Date & Time: 28 NOV 2023, 14.20 – 15.00
- Room: CGV1

Tutorial 3: Real-Time Electric Drive Simulation Approaches and Testing and Validation of Inverter ECUs on High Voltage Level.

Justus Voigt
dSPACE GmbH, HQ in Germany

- Date & Time: 28 NOV 2023, 15.20 – 16.00
- Room: CGV1

PLENARY SPEAKERS

Plenary 1: An ANN-based technique for Assessing Lithium-Ion Battery Health in Electric Vehicles applied in PEA-VOLTA Planform

Surin Khomfoi
King Mongkut's Institute of Technology Ladkrabang, Thailand

- Date & Time: 29 NOV 2023, 10.30 – 11.15
- Room: CGV1

Plenary 2: Advanced Multiphysics Optimization Techniques For Electric Motor Design.

Vincent LECONTE
Altair Engineering Inc.

- Date & Time: 30 NOV 2023, 09.40 – 10.20
- Room: CGV1

PANEL SESSION

Panel Topic: Panel on EV Battery Reuse and Recycling

Date & Time: 29 NOV 2023, 16.30 – 17.45

Room: CGV1

Panel Format: Informal talks

Panel Moderator:

Chris Mi
San Diego State University, USA

Panelist:

- **Chao Yan**
  Princeton NuEnergy, USA
- **Ariya Sangwongwanich**
  Assistant Professor, Aalborg University, Denmark
- **Yun Yang**
  Assistant Professor, Nanyang Technological University, Singapore
  Honorary Research Assistant Professor, The University of Hong Kong
- **Caiping Zhang**
  Professor, School of Electrical Engineering, Beijing Jiaotong University, China
- **Jun Xu**
  Professor, School of Mechanical Engineering, Xi'an Jiaotong University, China
  Director, Digital Energy Research Institute, GRESGYING & XJTU
  Director, Energy Storage and Inverter Institute, ADUC & XJTU
- **Haifeng Dai**
  Professor, School of Automotive Studies, Tongji University, China
  Director, Electrochemical power supply department, National Fuel Cell Vehicle and Powertrain System Research and Engineering Center, China

INDUSTRY PRESENTATIONS

- **Industry 1: Enhancing Academic Teaching of Power Electronics through Real-Time Simulation.**
  INFOMATIC PTE. LTD., Singapore **Time:** 28 NOV, 16.00
- **Industry 2: Empowering the EV Revolution: Dassault Systèmes Bridging the Gap for Industry and Education.**
  Dassault Systèmes **Time:** 29 NOV, 13.00
- **Industry 3: Overview of Phoenix Contact Charging Infrastructure in an All Electric Society.**
  Phoenix Contact (Thailand) Co., Ltd. **Time:** 29 NOV, 14.20
- **Industry 4: Addressing the Critical Challenge of Expanding EV Charging Infrastructure in Thailand.**
  PTR SMARTTECH CO., LTD. **Time:** 29 NOV, 13.40
- **Industry 5: Innovative wide bandgap semiconductor packages for higher power density onboard chargers.**
  Infineon Technologies Asia Pacific Pte Ltd, Singapore **Time:** 29 NOV, 15.00
- **Industry 6: Overview of High Power Density Power Supply Technology.**
  Delta Electronics, Thailand **Time:** 29 NOV, 15.40
- **Industry 7: ALTAIR GLOBAL ACADEMIC PROGRAM AND PARTNERING WITH UNIVERSITIES IN ELECTRIFICATION PROGRAM**
  Altair **Time:** 30 NOV, 10.30
- **Industry 8: EMC Noise Cancellation for New EV and HEV Applications.**
  Wurth Electronics Singapore Pte., Ltd., Singapore **Time:** 30 NOV, 11.10
- **Industry 9: ABB E-mobility is geared towards a sustainable future with net-zero emission.**
  ABB Electrification (Thailand) Co., Ltd. **Time:** 30 NOV, 13.00
- **Industry 10: A Concept Design of an EV Charging Station with Photovoltaic System and Battery Energy Storage System, Industry Point of View.**
  PEC Technology (Thailand) Co., Ltd., Thailand **Time:** 30 NOV, 13.40
- **Industry 11: Trends in Si/SiC/GaN based power device and module technologies and challenges.**
  Mitsubishi Electric Corporation, Japan **Time:** 30 NOV, 14.20
- **Industry 12: Novel automotive power unit with SiC chip.**
  Semikron Danfoss Co. Ltd., Hong Kong **Time:** 30 NOV, 15.00
- **Industry 13: DRIVING DECARBONISATION TOWARDS A SUSTAINABLE FUTURE - Siemens bring Technology with Purpose to power Electric Fleets.**
  Siemens **Time:** 30 NOV, 15.40

- **Industry 14: Advanced electric motor testing trends: flux, NVH, drive cycles, and electrical noise immunity.**
  HBK, Japan **Time:** 30 NOV, 16.20
- **Industry 15: Innovations in HIL Technologies to test and validate complex Power Electronics Applications.**
  Genetron Corp & Typhoon HIL, Singapore **Time:** 01 DEC, 09.00
- **Industry 16: Safe DC charging with insulation monitoring device.**
  Simplify Engineering Co., Ltd., Thailand **Time:** 01 DEC, 09.40
- **Industry 17: Overview of Electrical Drive Design and Testing System for Electric Vehicles in Thailand.**
  National Electronics and Computer Technology Center, Thailand **Time:** 01 DEC, 10.20
- **Industry 18: Data Driven with Realistic Sensor Simulation for Autonomous (AD) and Advanced Driver Assistant (ADAS) Function Development and Validation.**
  P G Intergroup Co., Ltd (Thailand) **Time:** 01 DEC, 11.00
- **Industry 19: Pervasive Simulation for Automotive Electrification.**
  Ansys Inc. **Time:** 28 NOV, 16.40

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PRESENTATION SCHEDULE ON 28 NOV 2023

Oral Presentations: None

Poster Presentations: None

Industry Presentations: 2 Presentations Time: 16.00 – 17.20

Highlighted Sessions:

- Keynote Speakers 1
  - **Keynote 1:** Electrical Power and Propulsion
    Amit K. Gupta Time: 13.00 – 13.40
- Tutorial Speakers 1 – 3
  - **Tutorial 1:** Hair-pin Winding Permanent Magnet Machines
    Ronghai Qu Time: 13.40 – 14.20
  - **Tutorial 2:** About Fast and Easy Modelling for the Design of Electrical Machines
    Noureddine TAKORABET Time: 14.20 – 15.00
  - **Tutorial 3:** Real-Time Electric Drive Simulation Approaches and Testing and Validation of Inverter ECUs on High Voltage Level
    Justus Voigt Time: 15.20 – 16.00

Presentation 28/11

The 2023 IEEE Transportation Electrification Conference and Expo, Asia-Pacific

Industry Session: 28IND1

Format: In-person (On-site)
Room: CGV1
Date & Time: 28 November 2023, 16.00 – 17.20
Chair: Somboon Sooksatra

IND1 16.00 – 16.40	**Enhancing Academic Teaching of Power Electronics through Real-Time Simulation.** Chien Ming Wu *INFOMATIC PTE. LTD., Singapore*
IND19 16.40 – 17.20	**Pervasive Simulation for Automotive Electrification.** Tushit Desai *Ansys Inc.*

Industry Presentation - 1

Topic: Enhancing Academic Teaching of Power Electronics through Real-Time Simulation.
Industry: INFOMATIC PTE. LTD., Singapore
Presenter: Chien Ming Wu

Abstract

Power electronics plays a fundamental role in modern electrical engineering, impacting various applications, from renewable energy integration to electric transportation systems. Effective teaching and learning of power electronics are paramount to preparing students for the evolving demands of the energy industry. This industry presentation session presents an innovative approach to enhancing academic teaching in power electronics through the integration of real-time simulation tools.

Traditional classroom instruction often faces limitations when conveying the intricate concepts and practical applications of power electronic circuits and systems. Real-time simulation tools, such as Hardware-in-the-Loop (HIL) platforms and simulation software, offer a dynamic and interactive environment for students to explore and experiment with power electronic circuits in real-world scenarios.

This session discusses the key components of real-time simulation for academic teaching in power electronics, encompassing hardware setups, modeling techniques, and software resources. It reviews various simulation platforms and highlights their capabilities in simulating power electronic converters, motor drives, and control algorithms.

Furthermore, the presentation addresses the pedagogical advantages of incorporating real-time simulation into power electronics courses. It explores how these tools foster active learning, provide immediate feedback, and encourage experimentation with different circuit configurations, control strategies, and component characteristics. Real-time simulation also enables students to bridge the gap between theory and practice, helping them develop a deeper understanding of complex concepts and practical challenges in power electronics.

The benefits of real-time simulation extend beyond the classroom, as students can apply their knowledge to real-world engineering projects, research endeavors, and industry internships. As power electronics continue to shape the future of electrical engineering, it is crucial to equip the next generation of engineers with the skills and knowledge needed to navigate this rapidly evolving landscape.

In conclusion, this presentation advocates for the adoption of real-time simulation tools as a transformative approach to enhance the academic teaching of power electronics. By bridging the gap between theory and practice, these tools empower students with the skills and confidence needed to excel in the dynamic field of power electronics, fostering innovation and sustainability in the renewable energy and electric vehicle sector.

Industry Presentation - 19

Topic: Pervasive Simulation for Automotive Electrification.
Industry: Ansys Inc.
Presenter: Tushit Desai

Abstract

The EV/HEV powertrain development does not have any legacy of experience similar to conventional powertrain. The effective implementation of numerical simulation is helping automotive engineers developing EV/HEV powertrain technologies in cost effective and reliable manner. Engineers are identifying the issues in early design stage, reduce number of prototypes with shorter design cycle and develop a robust and reliable solution.

Join us at Industry Presentation Track, where we will discuss how global companies are using simulation for EV Powertrain product development. Talk will include advances in system simulation tools coupled with 3D Physics accuracy. We will also be sharing Multiphysics methods which have become robust enough for virtual design verification.

PRESENTATION SCHEDULE ON 29 NOV 2023

Oral Presentations:	40	Presentations	Time: 13.00 – 16.30
Poster Presentations:	15	Presentations	Time: 14.50 – 16.30
Industry Presentations:	5	Presentations	Time: 13.00 – 16.20

Highlighted Sessions:

- Keynote Speakers 2 - 3
  - **Keynote 2:** Reuse and Recycling of EV batteries
    Chris Mi Time: 09.30 – 10.15
  - **Keynote 3:** Role of Motor Drives and Control in Transportation Electrification
    Babak Nahid-Mobarakeh Time: 11.15 – 12.00
- Plenary Speakers 1
  - **Plenary 1:** An ANN-based technique for Assessing Lithium-Ion Battery Health in Electric Vehicles applied in PEA-VOLTA Planform
    Surin Khomfoi Time: 10.30 – 11.15
- Panel Session
  - **Panel** on EV Battery Reuse and Recycling
    Chris Mi Time: 16.30 – 17.45

Oral Session: 29OS1
[POWER CONVERTER 1]
Format: In-person (On-site)
Room: CGV2
Date & Time: 29 November 2023, 13.00 – 14.40
Chair: Babak Nahid-Mobarakeh

OS1 13.00 – 13.20	**Comparison of Kalman Filter and Least Squares Regression-based RUL Estimation of Capacitors in Variable Speed Drives.** Prasanth Sundararajan, Jaydeep Saha, Marif Daula Siddique, Sanjib Kumar Panda *National University of Singapore, Singapore*
OS2 13.20 – 13.40	**A Leakage-Current Reduction Technique for Two-Stage Transformerless PV Inverters with Consideration of Resonant Phenomenon.** Pawaret Ampai, Surapong Suwankawin *Chulalongkorn University, Thailand*
OS3 13.40 – 14.00	**Another Novel Concept Selection of Hexagonal Switching State Vector for DPC of a Three-Phase PWM Rectifier.** Kittiphon Bantadtiang, Pisit Liutanakul, Nophadon Wiwatcharagoses *King Mongkut's University of Technology North Bangkok, Thailand*
OS4 14.00 – 14.20	**Adjustable Field PMSM with Rotary Transformer Using Zero-Phase Current and Armature Coil-End.** Kiyohiro Iwama, Toshihiko Noguchi *Shizuoka University, Japan*
OS5 14.20 – 14.40	**DAB Converter Performing Internal AC Heating and Power Transfer Simultaneously for Lithium-Ion Battery in Electronic Vehicles.** Koki Hida, Masatoshi Uno, Hyoga Hiranuma *Ibaraki University, Japan*

Oral Session: 29OS2
[DC-DC CONVERTERS FOR TRANSPORTATION ELECTRIFICATION]
Format: In-person (On-site)
Room: CGV3
Date & Time: 29 November 2023, 13.00 – 14.40
Chair: Nopporn Patcharaprakiti

OS6 13.00 – 13.20	**Simulation of Dual Active Bridge Converter for Hybrid Battery-Supercapacitor Energy Storage System for Electric Bicycles.** Satit Owatchaiphong, Thanachot Srimongkol, Narong Thumputi *King Mongkut's University of Technology North Bangkok, Thailand*
OS7 13.20 – 13.40	**Design and Modeling of A Hamiltonian Control Law for A Bidirectional Converter in DC Distribution Applications.** Methawin Jantra[1], Uthen Kamnarn[1], Burin Yodwong[2], Anon Namin[1], Charnyut Karnjanapiboon[1], Suchart Janjornmanit[1], Samart Yachiangkam[1], Pakawadee Wutthiwai[1], Krit Ratchapum[1], Ekkachai Chaidee[1], Surasak Yousawat[1], Teeruch Janjongcam[1], Suparak Srita[1], Pratch Piyawongwisal[1], Jedsada Yodwong[3], Noureddine Takorabet[4], Phatiphat Thounthong[2] *1) Rajamangala University of Technology Lanna, Thailand, 2) King Mongkut's University of Technology North Bangkok, Thailand, 3) Chalmers University of Technology, Sweden, 4) Université de Lorraine, France*
OS8 13.40 – 14.00	**Switch Fault Detection in a Family of Non-isolated Single-Inductor Three-Port Converters for Low Power Electrification Applications.** Krit Ratchapum[1], Uthen Kamnarn[1], Anon Namin[1], Pakawadee Wutthiwai[1], Matheepot Phattanasak[2], Ehsan Jamshidpour[3], Jana Khalil[3], Damien Guilbert[4] *1) Rajamangala University of Technology Lanna, Thailand, 2) King Mongkut's University of Technology North Bangkok, Thailand, 3) Université de Lorraine, France, 4) Universit´e le Havre Normandie, France*
OS9 14.00 – 14.20	**Modular-three-level buck converter for electrolyzer applications: current control with capacitors voltage balancing control.** Srimongkhon Udomkaew[1], Krittayot Sengsui[1], Wiset Saksiri[1], Matheepot Phattanasak[1], Roghayeh Gavagsaz-Ghoachani[2], Serge Pierfederici[3] *1) King Mongkut's University of Technology North Bangkok, Thailand, 2) Shahid Beheshti University, Iran, 3) Université de Lorraine, France*
OS10 14.20 – 14.40	**Performance Analysis of a Control Strategy for a Three-Level Interleaved Buck Converter for Proton Exchange Membrane Electrolyzer Applications.** Burin Yodwong[1], Pongsiri Mungporn[1], Suwat Sikkabut[1], Damien Guilbert[2], Matheepot Phattanasak[1], Melika Hinaje[3], Gianpaolo Vitale[4] and Phatiphat Thounthong[1] *1) King Mongkut's University of Technology North Bangkok, Thailand, 2) Universit´e le Havre Normandie, France, 3) Université de Lorraine, France, 4) Italian National Research Council of Italy, Italy*

Oral Session: 29OS3
[OPTIMAL INTEGRATION OF LARGE-SCALE ELECTRIC VEHICLES INTO POWER SYSTEMS WITH INCREASING RENEWABLE ENERGY 1]
Format: In-person (On-site)
Room: CGV4
Date & Time: 29 November 2023, 13.00 – 14.40
Chair: Neil Stephen Lopez

OS11 13.00 – 13.20	**A Deep Reinforcement Learning Method for Charging Station Management and Load Balancing.** Jie Liu, Zifan Liu, Xiaoying Tang *The Chinese University of Hong Kong, China*
OS12 13.20 – 13.40	**Joint Planning Method of Fast Charging Stations and Power Distribution Networks Based on K-Shortest Paths Algorithm.** Jiachen Wang[1], Chengcheng Shao[1], Qian Zhou[2], Dandan Zhu[2], Xiuli Wang[1], Xifan Wang[1] *1) Xi'an Jiaotong University, China, 2) Electric Power Research Institute of State Grid Jiangsu Electric Power Company, China*
OS13 13.40 – 14.00	**Coordinated Ride-hailing Order Scheduling and vehicle to grid for Autonomous Electric Vehicles Based on Independent Proximal Policy Optimization.** Jinxi Zhang, Lingming Kong, Hongcai Zhang *University of Macau, China*
OS14 14.00 – 14.20	**Price-based demand response in the coupled power and transportation network via EV charging station.** Zeyu Liang, Tao Qian, Qinran Hu *Southeast University, China*
OS15 14.20 – 14.40	**Real-Time Bidding Strategy for Electric Vehicles and Wind Power Participation in the Energy and Frequency Regulation Market.** Ruiyi Hao[1], Qian Zhang[1], Xiaosong Deng[2], Xiaohan Wu[1] *1) Chongqing University, China, 2) Changshou Power Supply Branch of State Grid Chongqing Electric Power Company, China*

Oral Session: 29OS4
[MOTOR DRIVE 1]
Format: In-person (On-site)
Room: CGV2
Date & Time: 29 November 2023, 14.50 – 16.30
Chair: Longya Xu

OS16 14.50 – 15.10	**Coordinated Control of Dual Movers for Permanent Magnet Synchronous Linear Motors.** Hesheng Zhang *Southeast University, China*
OS17 15.10 – 15.30	**New Overmodulation Strategy for Traction Motor in Electric Vehicles.** Myoeng-Won Kim, Minwoo Kim, Jung-Wook Park *Yonsei University, Korea (South)*
OS18 15.30 – 15.50	**A non-cascaded control strategy based on line-constrained EMPC for IPMSMs drive.** Han Wang, Jianyong Su *Harbin Institute of Technology, China*
OS19 15.50 – 16.10	**Safety-Critical Generalized Predictive Control for PMSM Drives Based on Control Barrier Function.** Zhongkun Cao, Jianliang Mao, Muhammad Irshad Khan, Xin Dong, Chuanlin Zhang *Shanghai University of Electric Power, China*
OS20 16.10 – 16.30	**Power Compensation Control of Electrolytic Capacitor-Less Dual-Inverter to Extend Motor Operating Region.** Taiju Sakurai[1], Hitoshi Haga[2] *1) Nagaoka University of Technology, Japan, 2) Shizuoka University, Japan*

Oral Session: 29OS5
[ELECTRIC VEHICLE SYSTEM ARCHITECTURES AND CONTROL]
Format: In-person (On-site)
Room: CGV3
Date & Time: 29 November 2023, 14.50 – 16.30
Chair: Shangjian Dai

OS21 14.50 – 15.10	**AI-Assisted Torque Control of an Interior Permanent Magnet Synchronous Machine.** Stephan Schüller, Rik De Doncker *RWTH Aachen, Germany*
OS22 15.10 – 15.30	**Resonant Switched Capacitor Converter with Conduction Losses Reduction by Generating Trapezoidal wave current for Electric Vehicles.** Ranma Kondo, Masatoshi Uno *Ibaraki University, Japan*
OS23 15.30 – 15.50	**Estimation of Energy Yield of a Solar Roof on EVs with Differential Power Processing Converter using a 3D Model and Validation of the Analytical Model.** Ryota Hiraide, Masatoshi Uno *Ibaraki University, Japan*
OS24 15.50 – 16.10	**Study of a Load-Independent LCC-S Compensated WPT System with Variable-Inductor Variable-Capacitor (VIVC) Techniques.** Lai Ching-Ming, Shin-Jung Tsai, Hao-En Liu, De-Tai Lin *National Chung Hsing University, Taiwan*
OS25 16.10 – 16.30	**Sliding Mode MRAS Observer for PMSM-Fed Electric Vehicle Control using Recurrent Neural Network-Based Parallel Resistance Estimator.** Sanjay Kumar Kakodia, Giribabu Dyanamina *Maulana Azad National Institute of Technology, India*

Oral Session: 29OS6
[ENERGY STORAGE SYSTEMS]
Format: In-person (On-site)
Room: CGV4
Date & Time: 29 November 2023, 14.50 – 16.30
Chair: Yun YANG

OS26 14.50 – 15.10	**An Iterative Learning Control Method for Non-Repetitive Electric Vehicle Battery Discharging.** Dinh Hoa Nguyen *Kyushu University, Japan*
OS27 15.10 – 15.30	**Analysis of cell-level abnormality diagnosis based on battery pack voltage information.** Woo Chan Kam, Jeongju Park, Hyeongyu Son, Sekyung Han *Kyungpook National University, Korea (South)*
OS28 15.30 – 15.50	**Interleaved multi-port converter with single inductor for photovoltaic energy storage systems.** Haojie Shi, Masatoshi Uno *Ibaraki University, Japan*
OS29 15.50 – 16.10	**Thermal analysis of an EV lithium iron phosphate battery pack for improved cooling.** Neil Stephen A Lopez, Christian Roice Tayag, Joshua Ezekiel Rito, Jeun Rei Barlis, Jose BIenvenido Manuel Biona *De La Salle University, Philippines*
OS30 16.10 – 16.30	**Comparative Assessment of Commercial High Energy and High Power Lithium-ion Batteries.** Atsawin Salee *Chulalongkorn University, Thailand*

Oral Session: 29OL1
[MACHINES AND ACTUATORS 1]
Format: Online
Room: PT1
Date & Time: 29 November 2023, 13.00 – 14.40
Chair: Jaewoo Jung

OL1 13.00 – 13.20	**Hybrid Learning Model-Based Inter-turn Short Circuit Fault Diagnosis of PMSM.** Hongjie Li[1], Jiachen Shen[2], Cenwei Shi[2], Tingna Shi[2] *1) Tianjin University, China, 2) Zhejiang University, China*
OL2 13.20 – 13.40	**Magnetic-thermal-solid coupling analysis of V-shaped outer rotor vernier in-wheel motor.** Xiuping Wang[1], Jiawei Zhang[1], Chunyu Qu[1], Chuqiao Zhou[1], Shenglong Jiang[2], Yan Li[2] *1) Shenyang Institute of Engineering, China, 2) State Grid Corporation of China, China*
OL3 13.40 – 14.00	**Research on Magnetic Circuit and Electromagnetic Performance of Combined-Pole Less-Rare-Earth Permanent-Magnet Synchronous Machine Used for Fully Electric Unmanned Aerial Vehicle.** Lingfang Fu, Weinan Wang, Shuo Wang, Liangkuan Zhu, Yiqi Liu, Jian Wei *Northeast Forestry University, China*
OL4 14.00 – 14.20	**A New Fourier Modeling Method for Switched Reluctance Motors Based on Small Sample Data.** Ping Ping, Yan Zhao *Dalian Maritime University, China*
OL5 14.20 – 14.40	**A Comparative Study of Eddy Current Speed Sensors for Rotating Speed Measurement of Iron Shafts.** Mehran Mirzaei, Pavel Ripka *Czech Technical University, Czech Republic*

Oral Session: 29OL2
[ELECTROCHEMICAL AND ENERGY DEVICES SMART MOBILITY]
Format: Online
Room: PT1
Date & Time: 29 November 2023, 14.50 – 16.30
Chair: Nisai Fuengwarodsakul

OL6 14.50 – 15.10	**Design and Analysis of a Torque Controller for an IPMSM using Reinforcement Learning.** Hafsa Murtaza Kaboolio[1], Stephan Schüller[1], Anne von Hoegen[1], Rik De Doncker[1], Nisai Fuengwarodsakul[2] *1) RWTH Aachen University, Germany, 2) King Mongkut's University of Technology North Bangkok, Thailand*
OL7 15.10 – 15.30	**Massive Connectivity Provision for V2X Based on Low Power IoT Standards.** Li Bing[1], Yating Gu[1], Lanke Hu[1], Mengjun Zhang[1], Yang Liu[1], Yue Yin[1], Tor M. Aulin[2] *1) Northwestern Polytechnical University, China, 2) Chalmers University of Technology, Sweden*
OL8 15.30 – 15.50	**The Influence of Rib and Porous Reactor Thickness on Topologically Optimized Structure in Reaction-Diffusion Systems.** Mengly Long[1], Mehrzad Alizadeh[2], Patcharawat Charoen-amornkitt[1], Takahiro Suzuki[2], Shohji Tsushima[2] *1) King Mongkut's University of Technology Thonburi, Thailand, 2) Osaka University, Japan*
OL9 15.50 – 16.10	**Rotor Electrical Fault Detection in Induction Generators Considering Low-Frequency Oscillations.** Lotfi Baghli[1], Mohammad Mardaneh[2], Akbar Rahideh[2], Zhaleh Hashemi[2] *1) GREEN / Université de Lorraine, France, 2) Shiraz University of Technology, Iran*
OL10 16.10 – 16.30	**Experimental Studies On Drivers Distractions: Investigating the Effects of Distractions on Driving Performance.** Mohammed Mynuddin[1], Lanre Gbenga Sadeeq[2], Sultan Uddin Khan[1], Mohammad Iqbal Hossain[1], Zayed Uddin Chowdhury[2], Foredul Islam[3], Md Jahidul Islam[4], Shantu Ghose[1] *1) North Carolina A & T State University, USA, 2) Georgia Southern University, USA, 3) Florida Polytechnic University, USA, 4) Tuskegee University, USA*

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Poster Session: 29OSP

Format: In-person (On-site)
Room: Exhibition Hall I
Date & Time: 29 November 2023, 14.50 – 16.30
Chair: Chengcheng Shao

P1	**Study of New Rotor Structure of Variable Flux Motor with Drawable Stator.** Iku Yamamoto[1], Katsuhiro Hirata[1], Noboru Niguchi[1], Hiroshi Kaneshige[2] *1) Osaka University, Japan, 2) THK CO. LTD, Japan*
P2	**Design of a GaN-Based Power Converter for Small-Sized Integrated Motor Drives.** Yuteng Yan[1], Ning Kang[1], Guanghui Yang[1], You Zhou[2], Shuangchun Xie[1], Christopher H. T. Lee[1] *1) Nanyang Technological University, Singapore, 2) Zhejiang University, China*
P3	**Torque Feedback MTPA Control Using Flux Approximation Surface.** Sota Kawashima, Keiichiro Kondo *Waseda University, Japan*
P4	**Investigation on Structures of Axial Gap Type Magnetic Multiple Spur Gear for In-Wheel Motor System of Electric Vehicle.** Taiga Kamijo[1], Kohei Aiso[1], Kan Akatsu[2], Yasuaki Aoyama[3] *1) Shibaura Institute of Technology, Japan, 2) Yokohama National University, Japan, 3) Hitachi Ltd Research and Development Group, Japan*
P5	**A Review on One-Axis Actively Positioned Bearingless Motors.** Theeraphong Srichiangsa[1], Weerasak Chaichan[2] *1) Kasetsart University, Thailand, 2) Rajamangala University of Technology Srivijaya, Thailand*

Poster Session: 29OSP (cont.1)

Format: In-person (On-site)
Room: Exhibition Hall I
Date & Time: 29 November 2023, 14.50 – 16.30
Chair: Chengcheng Shao

P6	**Electric Motor Drive Toolkits using Digital Signal Processor (DSP) based on Hardware-in-the-Loop (HIL) Technique.** Ukkarapon Photong, Jatuphon Raekriang, Theerawat Prawing, Pracha Khamphakdi, Narong Thongchim, Mongkol Pusayatanont *Ubonratchathani University, Thailand*
P7	**Modified Flux Observer based Sensorless PMSM Control for Hybrid Electric Vehicles.** Sumit Kumar, Bhim Singh *Indian Institute of Technolgy, Delhi, India*
P8	**Improved SRF-PLL Based Position Sensorless BLDC Motor in EV Drive With DC Offset Rejection.** Biswajit Saha, Bhim Singh *Indian Institute of Technolgy, Delhi, India*
P9	**Flux Modulated Motor Using Magnetic-Geared Structure.** Hikaru Suzuki, Katsuhiro Hirata, Noboru Niguchi *Graduate School of Eng. Osaka University, Japan*
P10	**Radiated EMI Reduction and Efficiency Improvement in WPT Systems with Passive Auxiliary Circuits for Soft-switching.** Ryohei Okada[1], Ryosuke Ota[2], Nobukazu Hoshi[1] *1) Tokyo University of Science, Japan, 2) Tokyo Metropolitan University, Japan*

Poster Session: 29OSP (cont.2)

Format: In-person (On-site)
Room: Exhibition Hall I
Date & Time: 29 November 2023, 14.50 – 16.30
Chair: Chengcheng Shao

P11	**Modified Single Switch Bridgeless PFC Converter based Sensorless PMSM Drive for Exhaust Fan.** Deepak Saw, Jaydeep Saha *Indian Institute of Technology Delhi, India*
P12	**IGBT Gate Boost Drive Technology for promoting the Overload Capacity of Traction Converter.** Xianjin Huang, Yong Jin, Guangang Gao, Li Zhu, Hu Sun, Fei Lin *Beijing Jiaotong University, China*
P13	**A New Discontinuous PWM Method Based on Neutral-Point Voltage Balancing and Low CMV for Single-Phase Three-Level Inverters.** Paiboon Kiatsookkanatorn[1], Napat Watjanatepin[1], Pennapa Pairodamonchai[2], Somboon Sangwongwanich[3], Surapong Suwankawin[3] *1) Rajamangala University of Technology Suvarnabhumi, Thailand, 2) King Mongkut's University of Technology North Bangkok, Thailand, 3) Chulalongkorn University, Thailand*
P14	**A Various-Time-Frame Frequency Control of Grid-forming Inverter for RE100 Microgrid in Building.** Phimnaphat Phonthani, Surapong Suwankawin *Chulalongkorn University, Thailand*
P15	**A Reduction of Entire Common-Mode Voltage by Self-Cancelling Technique for Two-Stage Transformerless PV Inverters.** Pawaret Ampai, Surapong Suwankawin *Chulalongkorn University, Thailand*

Industry Session: 29IND1

Format: In-person (On-site)
Room: CGV1
Date & Time: 29 November 2023, 13.00 – 16.30
Chair: Burin Kerdsup, Chonlatee Photong

IND2 13.00 – 13.40	**Empowering the EV Revolution: Dassault Systèmes Bridging the Gap for Industry and Education.** Nirajit Syamal *Dassault Systèmes*
IND4 13.40 – 14.20	**Addressing the Critical Challenge of Expanding EV Charging Infrastructure in Thailand.** Phoompat Jampeethong, Pallop Sripatana *PTR SMARTTECH CO., LTD.*
IND3 14.20 – 15.00	**Overview of Phoenix Contact Charging Infrastructure in an All Electric Society.** Pnich Boonwatcharachai *Phoenix Contact (Thailand) Co., Ltd.*
IND5 15.00 – 15.40	**Innovative wide bandgap semiconductor packages for higher power density onboard chargers.** Hong Jia Hong *Infineon Technologies Asia Pacific Pte Ltd, Singapore*
IND6 15.40 – 16.20	**Overview of High Power Density Power Supply Technology.** Jakrapong Wongsasulux, Chaiwichit Suraprechakul *Delta Electronics, Thailand*

Industry Presentation - 2

Topic: Empowering the EV Revolution: Dassault Systèmes Bridging the Gap for Industry and Education.
Industry: Dassault Systèmes
Presenter: Nirajit Syamal

Abstract

We have two key offerings to showcase, catering to both commercial (including applied research) and educational perspectives.

From a commercial standpoint, we will highlight Dassault Systèmes' Industry Solution Experiences:

- High-Performance Battery – offering a comprehensive end-to-end perspective on materials design, system behaviour analysis, cell validations, and battery integration.
- Battery Module & Pack Engineering – providing the capabilities to design and optimize battery/module pack performance to meet safety regulations, cost-efficiency, and durability requirements.
- Electro-Mobility Accelerator – offering support to EV innovators and industry-leading OEMs, covering the end-to-end process from systems engineering to mechanical engineering.

From an educational perspective, we will share our Industry Training Centre (ITC) programs, which are dedicated centres implemented within universities/institutes through collaboration with DS. These ITCs play a pivotal role in providing and delivering industry-accredited short courses and micro-credentials, aimed at addressing the skills gap in the EV market and supporting professional education and training.

Industry Presentation - 3

Topic: Overview of Phoenix Contact Charging Infrastructure in an All Electric Society.
Industry: Phoenix Contact (Thailand) Co., Ltd.
Presenter: Pnich Boonwatcharachai

Abstract

With the Global Mobility Market moving away from Fossil Fuels use in Energy Generation, the surgence for Renewable energy use is very real in the All Electric Society

Sustainably generated electricity is virtually the "primary energy source". However, the final energy used is not always electricity. Security of supply and a comprehensive coupling of the electricity, building, mobility, infrastructure, and industrial sectors will only become reality if electrical energy is also used as the basis for the production of synthetic fuels (e-fuels) through power-to-gas and power-to-liquid technologies.

A complete and sustainable energy turnaround is already on the horizon. Electrical energy can be generated from natural regenerative sources almost indefinitely and at low marginal costs. E-fuels can solve storage and transport issues.

Phoenix Contact will present their technology in the following areas to

1. Provide Charging Infrastructures in the field of Electromobility (Solutions now used in Market)

2. Create Charging solutions and Infrastructures with the Renewable Energy market for a sustainable future (Deployed Case studies)
3. Provide advanced applications that will be applied in the coming future (New Areas of application)

Technologies that will Highlighted and to be presented and shown are case studies in the area of

A) Sector Coupling – the holistic approach The key lies in the possibility of economic implementation.

This can be achieved by means of energy efficiency and by optimizing the energy- and data-related couplings and balancing all energy consumers, generators, and potential storage options in the best way possible.

B) Smart Charging Infrastructures – that will make use of and manage optimal energy usage from Various supply sources

Objectives of the scope of these implementation

The application Smart Charging Infrastructures and Sector Coupling is making use of clean renewable energy generators distributing to consumers whom are separated by large distances at the time of demand and supply from the Energy Supply Market place

Energy generation and the economic growth which is based on it can therefore take place in regions of the world that are still economically underdeveloped today.

Not only a climate-neutral energy supply, but also an increase of agricultural and industrial production as the basis for economic growth for everyone.

Industry Presentation - 4

Topic: Addressing the Critical Challenge of Expanding EV Charging Infrastructure in Thailand.
Industry: PTR SMARTTECH CO., LTD.
Presenter: Phoompat Jampeethong, Pallop Sripatana

Abstract

Committed to advancing electric vehicle (EV) infrastructure in Thailand, we aim to create solutions to rectify the urgent issue of limited EV charging locations in the region. Leveraging our expertise gained from over 15 years of experience in a real laboratory, we possess a deep understanding of both the challenges and opportunities.

Thailand is currently witnessing a substantial surge in EV adoption, and it is evident that our existing charging infrastructure is struggling to keep pace with this burgeoning demand. Despite our robust partnerships with institutions such as KMITL, PEA, MEA, EGAT, and several esteemed global collaborators, we recognize the need for further action.

To address the scarcity of charging locations and ensure convenient access for EV owners, we need to strategically expand charging points across Thailand. Collaboration between industry leaders and partners is crucial, covering urban and rural areas for widespread accessibility. Automakers, tech companies, and EV stakeholders must consolidate resources through partnerships to stabilize and expand the charger network across Thailand.

Our development and solution:

Charger Intelligent Power Output System (CIPOS): CIPOS is an innovative system within the charger that is capable of learning from each EV car charging session and autonomously establishing the most optimal charging profile specific to each car brand and model. This dynamic adjustment ensures optimal performance and heat reduction during the charging session, ultimately reducing the required charge time and helping to prolong battery life.

Electric Vehicle Autocharge Authenticator (EVAA): EVAA authenticates the uniqueness of the EV ID during the autocharging process between the electric vehicle and the charger. EVAA acts as an independent gateway, autonomously managing the registration, authentication, and error reporting during the handshaking stage. The system also establishes a direct line of communication with vehicle manufacturers in real-time to report discrepancies. This significantly improves the overall efficiency and security of the EV autocharging experience.

Integration Compatibility Testing System (ICTS): Inefficient integration of various charger brands and software systems has led to delays and drawbacks in the expansion of the charging network. ICTS is the closest thing to a standardized integration testing system, derived from years of testing and development in collaboration with key stakeholders in Thailand. We welcome charger brands, investors, and operators who may require our assistance in establishing and scaling their charger network operations.

The shortage of charging locations and issues with faulty chargers and software have understandably shaken consumer confidence. Our strategy involves increasing transparency regarding charger availability, ensuring ease of use, implementing reliable systems, and providing robust customer support. By addressing these concerns, we aim to rebuild trust in the EV infrastructure.

The EV market in Thailand stands on the brink of significant growth, and any delay in taking action will only exacerbate the challenges. We wholeheartedly acknowledge the urgency of the situation and are committed to delivering swift, impactful solutions. The expansion of EV infrastructure in Thailand is not the responsibility of a single entity; it is a collaborative endeavor that requires the engagement of all stakeholders. By addressing the shortage of charging locations, streamlining integration processes, and restoring consumer confidence, we aim to promote the widespread adoption of electric vehicles. We eagerly anticipate further discussions on these strategies during the event and anticipate the combined efforts of the industry in driving this transformative change for a sustainable future.

Industry Presentation - 5

Topic: Innovative wide bandgap semiconductor packages for higher power density onboard chargers.
Industry: Infineon Technologies Asia Pacific Pte Ltd, Singapore
Presenter: Hong Jia Hong

Abstract

Wide bandgap semiconductor devices bring significant power efficiency to a variety of applications. Semiconductor suppliers innovative portfolio of wide bandgap semiconductors is addressing state-of-the art electronics used in chargers and adapters for consumer applications, EV charging, telecom, SMPS, solar, and battery formation for industrial applications, as well as in onboard charging, high-voltage to low voltage DC-DC converters and traction inverters for automotive applications. The OBC in an EV is responsible for converting AC grid power into DC voltage to charge the traction battery, but its size and weight can

negatively impact the vehicle's range. For reducing weight and volume while supporting an ever-higher range – power density is key in OBC designs. Leading designers are working constantly towards increasing the power density levels as much as possible, with a goal to reach 6 kW/L by the end of the decade. The use of wide bandgap semiconductors in new circuit topologies and innovative packaging techniques are the key enabler to revolutionize On Board Chargers designs. Designers are taking advantage of wide bandgap technologies such as SiC and GaN to meet the challenges of the next generation of OBCs, such as growing demand for higher power classes. This has led to changes in topologies and implementations, such as active and efficient rectifiers and fast-switching techniques, which have allowed for an increase in power density while maintaining a high power conversion efficiency. Additionally, the wide voltage offering of 650V and 1200V power semiconductors allows for the coverage of different battery voltages as well as three-phase topologies. Innovative packages offer significant advantages at both the device and system levels, fulfilling the demanding requirements of cutting-edge high-power designs. To help customers transition from the TO220 and TO247 THD devices, innovation SMD packages and modules have been defined to deliver equivalent thermal capabilities with improved electrical performance. With such innovative packages, engineers will be able to design a complete application such as OBC and traction inverter with a higher power density that are required in today vehicle electrification. This work discusses the different case studies of innovative packages that allows engineers to design and develop automotive onboard chargers with benchmarking high-power densities.

Industry Presentation - 6

Topic: Overview of High Power Density Power Supply Technology
Industry: Delta Electronics, Thailand
Presenter: Jakrapong Wongsasulux, Chaiwichit Suraprechakul

Abstract

The increasing adoption of transformative technologies, such as Artificial Intelligence (AI), Scientific Simulation, Huge data processing, and 5G, has fueled a significant surge in power consumption in data centers, cloud computing, and networking infrastructures. This rapid growth has raised environmental concerns, emphasizing the need for Higher Power Efficiency to mitigate the impact on our ecosystem, carbon footprint, and global warming. Consequently, achieving High Efficiency and high power density has become a primary challenge in Power Supply design, driven by both system architect designer requirements and government policies.

Wide bandgap technology devices (WBG devices), such as Silicon Carbide (SiC) and Gallium Nitride (GaN) devices, have emerged as crucial enablers in addressing these challenges. A significant improvement on figure of merit (FOM), which result in low switching loss compare to Si FET. The zero reverse recovery allows for the implementation of bridgeless totem-pole PFC topology. Additionally, the reduced output capacitance of wide bandgap devices enables DC/DC power converters, such as LLC resonant converters, to operate at higher frequencies, resulting in increased power density and efficiency.

The Power Factor Correction (PFC) circuit, responsible for correcting or compensating the current shape to meet product requirements, plays a pivotal role. Bridgeless PFC, notably the totem pole PFC, contributes significantly to achieving high efficiency and power density in power supply units (PSUs) by eliminating power losses caused by diode forward voltage without the need for a diode bridge rectifier. However, solely relying on the totem pole PFC topology with hard switching Continuous Conduction Mode (CCM) operation may prove inadequate when higher power density is needed. Thus, other novel techniques like Triangular Current Mode (TCM), Multi-Level topologies are being widely explored to fulfill the desired requirements effectively.

High-Efficiency DC/DC converters are still essential for power supply design. The popularity of the LLC resonant converter stems from its simplicity, high gain, and soft-switching capabilities. Nonetheless, it still presents challenges when higher frequency is needed due to the emergence of WBG, including low loss high-frequency magnetic design, control complexities, and critical component layout/packaging for high-frequency operation.

This presentation provides a comprehensive overview of high-frequency power conversion techniques such as PFC topologies, control techniques, resonant converter, challenges in magnetic and high-frequency design, and packaging. It also covers the impacts of WBG technology, such as efficiency and power density, when compared to Silicon Devices.

Lastly, the future trend of Wide Band Gap Devices, including Integrated driver power switches, is discussed, envisioning further advancements in power electronics.

By elucidating these critical aspects, this presentation aims to enrich the understanding of power supply design complexities and pave the way for more efficient and sustainable power systems.

PRESENTATION SCHEDULE ON 30 NOV 2023

Oral Presentations:	59	Presentations	Time: 10.30 – 16.30
Poster Presentations:	15	Presentations	Time: 14.50 – 16.30
Industry Presentations:	8	Presentations	Time: 10.30 – 17.00

Highlighted Sessions:

- Keynote Speakers 4
  - **Keynote 4:** Electromagnetic Vibration of Electrical Machines – Theoretical Analysis and Optimal Design
    Jian-Xin Shen Time: 09.00 – 09.40
- Plenary Speakers 2
  - **Plenary 2:** Advanced Multiphysics Optimization Techniques For Electric Motor Design.
    Vincent LECONTE Time: 09.40 – 10.20

Oral Session: 30OS1
[ELECTRIC VEHICLE INFRASTRUCTURE]
Format: In-person (On-site)
Room: CGV2
Date & Time: 30 November 2023, 10.30 – 12.10
Chair: Teerasak Somsak

OS31 10.30 – 10.50	**Wireless Power Transfer System for Autonomous Driving Robot Battery Charging.** Worapong Pairindra[1], Surin Khomfoi[1], Phatiphat Thounthong[2], Noureddine Takorabet[3] *1) King Mongkut's Institute of Technology Ladkrabang, Thailand, 2) King Mongkut's University of Technology North Bangkok, Thailand, 3) Université de Lorraine, France*
OS32 10.50 – 11.10	**Non-isolated Onboard EV Charger Controller Design Based on Port-Hamiltonian Approach.** Nattapon Somboonpanya, Surin Khomfoi, Teeraphon Phophongviwat *King Mongkut's Institute of Technology Ladkrabang, Thailand*
OS33 11.10 – 11.30	**Hamiltonian-Differential Flatness Control Laws for Battery/Ultracapacitor for Hybrid Electric Vehicle Applications.** Pongsiri Mungporn[1], Surin Khomfoi[1], Ridtee Inteeworn[2], Apinun Gonmanee[3], Serge Pierfederici[4], Babak Nahid-Mobarakeh[5], Noureddine Takorabet[4], Nicu Bizon[6], Burin Yodwong[7], Phatiphat Thounthong[7] *1) King Mongkut's Institute of Technology Ladkrabang, Thailand, 2) Provincial Electricity Authority, Thailand, 3) Khon Kaen Technical College Institute of Vocational Education, Thailand, 4) Université de Lorraine, France, 5) McMaster University, Canada, 6) University of Pitesti, Romania, 7) King Mongkut's University of Technology North Bangkok, Thailand*
OS34 11.30 – 11.50	**Sensitivity Analysis for Electric Vehicle Hosting Capacity in Distribution Networks.** Ashish Kumar Karmaker[1], Sam Behrens[2], Hemanshu Pota[1] *1) University of New South Wales, Canberra, 2) Commonwealth Scientific and Industrial Research Organization, Australia*
OS35 11.50 – 12.10	**Performance Characterization of a Developed Battery Electric Tricycle.** Leo Allen S. Tayo[1], Lew Andrew R. Tria[1], Janine D. Giron[1], Belle S. Sermeno[1], Alessandro T. Santiago[1], John Angelo N. Yago[1], Mark Arnel B. Domingo[1], Marc Angelo T. Cabaddu[2], Lemuel B. Purisima[2] *1) University of the Philippines Diliman, Philippines, 2) Cagayan State University, Philippines*

Oral Session: 30OS2
[POWER CONVERTER 2]
Format: In-person (On-site)
Room: CGV3
Date & Time: 30 November 2023, 10.30 – 12.10
Chair: Somboon Sooksatra

OS36 10.30 – 10.50	**Analysis of Phase-Shift Algorithm for Single-Shunt Current Sensing with Two-Arm Modulation.** Rattapon Wayamanon, Pennapa Pairodamonchai, Nophadon Wiwatcharagoses *King Mongkut's University of Technology North Bangkok, Thailand*
OS37 10.50 – 11.10	**Alternative Control Methodology of Grid-Supporting Grid-Forming Power Converter with a Proportional Complex-Vector Controller.** Somkiart Khongkhachat[1], Surin Khomfoi[2] *1) Thonburi University, Thailand, 2) King Mongkut's Institute of Technology Ladkrabang, Thailand*
OS38 11.10 – 11.30	**A New Switching Pattern to Reduce Common-Mode Voltage for Matrix Converters Based on Minimum Number of Switchings.** Paiboon Kiatsookkanatorn[1], Pennapa Pairodamonchai[2], Somboon Sangwongwanich[3] *1) Rajamangala University of Technology Suvarnabhumi, Thailand, 2) King Mongkut's University of Technology North Bangkok, Thailand, 3) Chulalongkorn University, Thailand*
OS39 11.30 – 11.50	**Fast Calculation of Semiconductor Steady-State Junction Temperatures in Power Converters.** Benjamin Luckett, Jiangbiao He *University of Kentucky, USA*
OS40 11.50 – 12.10	**A Fault-Tolerant Multilevel Inverter (FT-MLI) Topology for Electric Vehicle Applications.** Marif Daula Siddique, Prasanth Sundararajan, Mrutyunjaya Sahani, Sanjib Kumar Panda *National University of Singapore, Singapore*

Oral Session: 30OS3
[CHARGING LOAD FORECASTING AND COORDINATION STRATEGIES]
[ELECTROCHEMICAL ENERGY DEVICES: PERFORMANCE, SAFETY, AND LIFESPAN]
Format: In-person (On-site)
Room: CGV4
Date & Time: 30 November 2023, 10.30 – 12.10
Chair: Tianran He

OS41 10.30 – 10.50	**Simulation-based Comparative Study of EV Energy Consumption and Effects on the Lithium-ion Battery Aging under Different Driving Cycles.** Makarapun Makaramani, Nutthapon Wongyao, Kitchanon Ruangjirakit *King Mongkut's University of Technology Thonburi, Thailand*
OS42 10.50 – 11.10	**Effectiveness of Spraying F-500 Substance of Twin-Fluid Nozzle on Suppression for Lithium-Ion Battery Cell Fires.** Yossapong Laoonual, Poramet Aiemsathit, Wella Hewage Hasarinda Amila Kariyawasam, Paonrat Narkchinwong, Jiraporn Sriburin *King Mongkut's University of Technology Thonburi, Thailand*
OS43 11.10 – 11.30	**Photovoltaic System Realizing Reduced Power Rating and Circuit Volume in Combination with Partially Connected Converter and Differential Power Processing Converter.** Keita Sugiura, Joji Yabuki, Masatoshi Uno *Ibaraki University, Japan*
OS44 11.30 – 11.50	**Distributed control of electric vehicle clusters for user-based power scheduling.** Xihai Cao, Jan Engelhardt, Charalampos Ziras, Mattia Marinelli *Technical University of Denmark, Denmark*
OS45 11.50 – 12.10	**Automatic Battery Swapping Model for Efficient Charging of Solar-based EV.** Vishal Singh[1], Shantanu Saxena[1], Rajan Kumar[2], Sudhakar Modem[1] *1) Indian Institute of Technology, India*, 2*) National Institute of Technology, India*

Oral Session: 30OS4
[MACHINES AND ACTUATORS 2]
Format: In-person (On-site)
Room: CGV2
Date & Time: 30 November 2023, 13.00 – 14.20
Chair: Yanlei Yu

OS46 13.00 – 13.20	**Review of the Current Research Status of High Efficiency Liquid Cooling Technology for High Power Density Motors.** Shanshan Yang, Chuang Liu, Zhou Zhou, Xuezhong Zhu *Nanjing University of Aeronautics & Astronautics, China*
OS47 13.20 – 13.40	**Comparison of Coaxial Magnetic Gears Using Rare Earth and Nonrare Earth Permanent Magnets.** Byeong-Cheol Bae, So-Yeon Im, Seung-Hun Lee, Myung-Seop Lim *Hanyang University, Korea (South)*
OS48 13.40 – 14.00	**Rotor Intensity Analysis of High-speed Axial Flux PM Machine for Electric Traction.** Weiwei Geng[1], Yu Fu[1], Shirong Ge[1], Jing Wang[1], Shuai Wang[1], Yu Wang[2] *1) Nanjing University of Science and Technology, China, 2) Fudan University, China*
OS50 14.00 – 14.20	**Non-Destructive Testing Methodology for Impregnation Quality Identification of Segmented Stators in A Traction Motor.** Gabriele Piombo[1], Xiyun Ma[1], Simon Guicheteau[2], Juliette Soulard[1] *1) University of Warwick, UK (Great Britain), 2) Altair Engineering Ltd., UK (Great Britain)*

Oral Session: 30OS5
[THE EMERGING TECHNOLOGIES FOR HIGH-SPEED PERMANENT MAGNET MACHINES AND DRIVES]
Format: In-person (On-site)
Room: CGV3
Date & Time: 30 November 2023, 13.00 – 14.40
Chair: Sanjib Kumar Panda

OS51 13.00 – 13.20	**Influence of Annealing on the Iron Loss of Amorphous Alloy High-speed Permanent Magnet Motors Based on the Preisach Hysteresis Model.** Tianran He[1], Shiyi Liu[1], Wei Li[1], Shangjian Dai[2] *1) Tongji University, China, 2) Southeast University, China*
OS52 13.20 – 13.40	**6-Slot/2-Pole Permanent Magnet Motors with Non-overlapping Two Coil-Pitch Windings for Ultra-High-Speed Applications.** Tianran He[1], Zi Qiang Zhu[2], Dawei Liang[2], Hong Bin[3], Di Wu[3], Jintao Chen[3] *1) Tongji University, China, 2) University of Sheffield, UK (Great Britain), 3) Midea Group Corporate Research Center, China*
OS53 13.40 – 14.00	**Fibre Bragg Grating Sensor Based Winding Strain Monitoring and Insulation Lifetime Prediction.** Hao Chen[1], Jiabin Wang[1], Geraint Wyn Jewell[1], Carl Boettcher[2], Ellis Chong[2] *1) University of Sheffield, UK (Great Britain), 2) Rolls-Royce plc, UK (Great Britain)*
OS54 14.00 – 14.20	**An Investigation of Substituting Copper with Aluminum Conductors in a High Power, Medium Speed SPM Machine.** Yangyu Sun, Wenjun Zhu, Geraint Wyn Jewell, Xiao Chen *University of Sheffield, UK (Great Britain)*
OS55 14.20 – 14.40	**Radial Force Suppression Method Using A Redundant Degrees of Freedom of Double-star PMSM.** Takumi Soeda[1], Hitoshi Haga[2] *1) Nagaoka University of Technology, Japan, 2) Shizuoka University, Japan*

Oral Session: 30OS6
[THE PROTOTYPING FOR TRANSPORTATION ELECTRIFICATION]
Format: In-person (On-site)
Room: CGV4
Date & Time: 30 November 2023, 13.00 – 14.40
Chair: Nguyen Dinh Hoa

OS56 13.00 – 13.20	**Development of a Mobile Application-Based System Diagnostics and Monitoring for a Battery Electric Vehicle.** Janine D. Giron, Belle S. Sermeno, Alessando T. Santiago, John Angelo N. Yago, Mark Arnel B. Domingo, Leo Allen S. Tayo, Lew Andrew R. Tria *University of the Philippines Diliman, Philippines*
OS57 13.20 – 13.40	**On the use of parametric stator models for electrical machine vibration computation.** Sebastian Ciceo[1,2], Maria Raluca Raia[2], Johan Gyselinck[1], Claudia Martis[2] *1) Universite´ Libre de Bruxelles, Belgium, 2) Technical University of Cluj-Napoca, Romania*
OS58 13.40 – 14.00	**Baseline Determination for Drive Cycle Performance Analysis of Induction Motors.** Kourosh Heidarikani, Pawan Kumar Dhakal, Roland Seebacher, Annette Muetze *Graz University of Technology, Austria*
OS59 14.00 – 14.20	**Baseline Determination for Drive Cycle Performance Analysis of Permanent Magnet Synchronous Motors.** Pawan Kumar Dhakal, Kourosh Heidarikani, Roland Seebacher, Annette Muetze *Graz University of Technology, Austria*
OS60 14.20 – 14.40	**Electric Bus State-Of-Health Aware Cost Analysis Given Energy Consumption and Initial Battery Purchase Price.** Tiago S. Miranda, Atriya Biswas, Ali Emadi *McMaster University, Canada*

Oral Session: 30OS7
[MACHINES AND ACTUATORS 3]
Format: In-person (On-site)
Room: CGV2
Date & Time: 30 November 2023, 14.50 – 16.30
Chair: Pracha Khamphakdi

OS61 14.50 – 15.10	**Analysis of Active Axial Magnetic Suspension Regulation for a Unsymmetrical Single-Drive Bearingless Motor.** Theeraphong Srichiangsa[1], Rikuya Oe[2], Akira Chiba[2] *1) Kasetsart University, Thailand, 2) Tokyo Institute of Technology, Japan*
OS62 15.10 – 15.30	**A Novel Phase-Unit Axial-Modular Permanent Magnet Vernier Machine With Integral-Slot Non-Overlapping Concentrated Winding.** Yanlei Yu[1], Feng Chai[2], Yulong Pei[2], Shuangchun Xie[1], Libing Cao[1], Christopher H. T. Lee[1] *1) Nanyang Technological University, Singapore, 2) Harbin Institute of Technology, China*
OS63 15.30 – 15.50	**Operating characteristics of adjustable-field permanent magnet motors with 3D magnetic paths and asymmetric magnet arrangement.** Yutaro Hiyoshi, Kotaro Doi, Toshihiko Noguchi *Shizuoka University, Japan*
OS64 15.50 – 16.10	**Design Optimization and Comparative Analysis of Permanent-Magnet Vernier Machines with Single-Winding Design.** Libing Cao[1], Xuhui Zhu[1], Guanghui Yang[2], Yanlei Yu[1], Chenhao Zhao[1], Junwei Goh[1], Christopher H. T. Lee[1] *1) Nanyang Technological University, Singapore, 2) Zhejiang University, China*
OS65 16.10 – 16.30	**Deep Transfer Learning-Based Demagnetization Analysis for Linear Oscillating Actuator Considering Circumferential Segmented Structure.** Ji-hyeon Lee[1], Soo-Hwan Park[1], Duha Park[1], Myung-Seop Lim[1], Jae-Hoon Jeong[2] *1) Hanyang University, Korea (South), 2) LG Electronics, Korea (South)*

Oral Session: 30OS8
[SPECIALIZE TOPICS ON TRANSPORTATION ELECTRIFICATION 1]
Format: In-person (On-site)
Room: CGV3
Date & Time: 30 November 2023, 14.50 – 16.30
Chair: Masayuki Morimoto

OS66 14.50 – 15.10	**Optimal Scheduling of Electric Harbour Craft Fleet Operations.** Victor Maquart, Huajun Zhang, Kyaw Hein, Dominique Bertin, Edouard Lavillonniere *EDF, Singapore*
OS67 15.10 – 15.30	**Optimization of hybrid energy storage system and energy management for aerial vehicles.** Chunwu Xiao, Bin Wang, Chaohui Wang, Yizhe Yan *Xi'an Jiaotong University, China*
OS68 15.30 – 15.50	**Hierarchical Control Strategy for Fuel Cell-Battery Shipboard Power System Utilizing a Modular Control Architecture.** Timon Kopka, Charlotte Löffler, Andrea Coraddu, Henk Polinder *Delft University of Technology, The Netherlands*
OS69 15.50 – 16.10	**Modelling and Sizing Framework for Hybrid-Electric Aircraft Architecture Development.** Ayesha R E Wise[1], Artem Kolisnichenko[2], Serhiy Bozhko[1], Sharmila Sumsurooah[1], Seang Shen Yeoh[1] *1) University of Nottingham, United Kingdom (Great Britain), 2) Leonardo S.p.A., Italy*
OS70 16.10 – 16.30	**Power Flow Analysis of Advanced Power Generation Centre for More Electric Aircraft.** Ge Bai[1], Tao Yang[1], Seang Shen Yeoh[1], Serhiy Bozhko[2], Patrick Wheeler[1] *1) University of Nottingham, United Kingdom (Great Britain), 2) The University of Nottingham, China*

Oral Session: 30OS9
[SPECIALIZE TOPICS ON TRANSPORTATION ELECTRIFICATION 2]
Format: In-person (On-site)
Room: CGV4
Date & Time: 30 November 2023, 14.50 – 16.30
Chair: Lew Andrew Tria

OS71 14.50 – 15.10	**Contribution of a tunnel to train-running energy consumption for Nakhon Sawan - Mae Sot Railway Line Project.** Jukkrit Kluabwang *Rajamangla University of Technology Lanna Tak & Electrical Energy Research Unit, Thailand*
OS72 15.10 – 15.30	**Development of an Omni-directional Human-friendly Mobility Platform for Industrial Warehouse.** Jung Hyun Choi, Yongsik Jin *Electronics and Telecommunications Research Institute, Korea (South)*
OS73 15.30 – 15.50	**EV Driving Motor Faults diagnosis with BP Neural Network Optimized by Genetic Algorithm.** Tianle Li[1], Yahui Zhang[2], Baichuan Xu[1], Cheng Luo[1], Yixiao Luo[1], Kai Yang[1] *1) Huazhong University of Science and Technology, China, 2) State Grid Wuxi Power Supply Company, China*
OS74 15.50 – 16.10	**Power Angle Control of a Unified Power Quality Conditioner in Railway Electrification System.** Krittapas Chaiyaphun[1], Phonsit Santiprapan[1], Chakrit Panpean[2], Kongpol Areerak[3] *1) Prince of Songkla University, Thailand, 2) King Mongkut's University of Technology North Bangkok, Thailand, 3) Suranaree University of Technology, Thailand*
OS75 16.10 – 16.30	**Coordinated Charging and Discharging of Electric Vehicles With Multiple Trips.** Zechun Hu, Xiaoyu Duan *Tsinghua University, China*

Oral Session: 30OL1
[OPTIMAL INTEGRATION OF LARGE-SCALE ELECTRIC VEHICLES INTO POWER SYSTEMS WITH INCREASING RENEWABLE ENERGY 2]
Format: Online
Room: PT1
Date & Time: 30 November 2023, 10.30 – 12.10
Chair: Zechun Hu

OL11 10.30 – 10.50	**Day-ahead charging load forecasting of electric bus fast charging station based on CEEMDAN-SSA-LSTM.** Pengcheng Yin, Yan Bao, Senyong Fan, Shihao Chen *Beijing Jiaotong University, China*
OL12 10.50 – 11.10	**Deep reinforcement learning method for energy management in fast charging station.** Shihao Chen, Yan Bao, Jinkai Shi, Pengcheng Yin, Zhihao Wang *Beijing Jiaotong University, China*
OL13 11.10 – 11.30	**A Dynamic Optimization Method for Active Distribution Network Considering the Regulating Capacity of Electric Vehicles.** Fan Xiao[1], Yuefei Deng[2], Dan Liu[1], Ping Xing[1], Kan Cao[1], YiQun Kang[1] *1) State Grid Electric Power Research Institute, China, 2) China Three Gorges University, China*
OL14 11.30 – 11.50	**Research on Networked Protection Scheme of Active Distribution Networks with Doubly Fed Wind Turbines and Electric Vehicles.** Fan Xiao[1], Dan Liu[1], Ping Xing[1], Kan Cao[1], YiQun Kang[1], Chengzhao Wang[2] *1) State Grid Electric Power Research Institute, China, 2) China Three Gorges University, China*
OL15 11.50 – 12.10	**Electric Vehicle Ecosystem development in Malaysia: challenges and solutions.** Adam Junid, Azalan Sulaiman, Jasmer Sathilan *PLUS Berhad, Malaysia*

Oral Session: 30OL2
[POWER CONVERTER 3]
Format: Online
Room: PT1
Date & Time: 30 November 2023, 13.00 – 14.40
Chair: Christopher H. T. Lee

OL16 13.00 – 13.20	**Coupled Inductor Based Single-Switch Ultrahigh Step-up Hybrid Switched Capacitor Converter.** Yu Fu, Yuzhe Wang, Qiushuang Wei, Shouxiang Li *Beijing Insititute of Technology*, China
OL17 13.20 – 13.40	**On-Board Integrated Charger Based on Open-End Winding AC Machine.** Thidarat Thanakam, Neerakorn Jarutus, Yuttana Kumsuwan *Chiang Mai University, Thailand*
OL18 13.40 – 14.00	**A Single-Stage DC Motor Driver Based on Class-E Resonant Wireless Power Transfer Technique.** Lai Ching-Ming[1], Hao-En Liu[1], De-Tai Lin[1], Tomokazu Mishima[2], Chi K. Tse[3] *1) National Chung Hsing University, Taiwan, 2) Kobe University, Japan, 3) City University of Hong Kong, Hong Kong*
OL19 14.00 – 14.20	**A Novel Wireless Power Transfer System with Reflex-Charging and Cell-Balancing Functions.** Lai Ching-Ming[1], Jain-Ting Lin[1], Hao-En Liu[1], Tomokazu Mishima[2] *1) National Chung Hsing University, Taiwan, 2) Kobe University, Japan*
OL20 14.20 – 14.40	**Bus-bar Design for Silicon-Carbide based Medium Voltage Full-bridge Based Converter Topologies.** Prashant Surana, Thomas Ebel, Ramkrishan Maheshwari *University of Southern Denmark, Denmark*

Oral Session: 30OL3
[CHARGING INFRASTRUCTURE AND THERMAL MANAGEMENT, PACKAGING DESIGN]
Format: Online
Room: PT1
Date & Time: 30 November 2023, 14.50 – 16.30
Chair: Zaixin Song

OL21 14.50 – 15.10	**Thermal Modeling of the Slot of an Electric Machine considering Position Deviations of Individual Conductors.** Lucas Brenner, Dieter Gerling *University of the Bundeswehr Munich, Germany*
OL22 15.10 – 15.30	**Optimal Operation of On-Grid Park & Ride EV Parking Station Considering Dynamic Pricing in Japan.** Soichiro Ueda[1], Masahiro Furukakoi[2], Hasan Masrur[3], Narayanan Krishnan[4], Ashraf Mohamed Hemeida[5], Tomonobu Senjyu[1] *1) University of the Ryukyus, Japan, 2) Sasebo College, Japan, 3) King Fahd University of Petroleum and Minerals, Saudi Arabia, 4) SASTRA Deemed University, India, 5) Aswan University, Egypt*
OL23 15.30 – 15.50	**Half Bridge DC-DC Converter Based Li/Ion Charger Fed By Hysteresis Controlled PFC SEPIC Converter.** Erdal Sehirli *Kastamonu University, Turkey*
OL24 15.50 – 16.10	**Energy Efficiency Analysis of Electric Vehicle System Components.** Lassi Aarniovuori, Dong Liu, Juhamatti Korhonen, Juha Pyrhonen, Pertti Kauranen, Ville Tikka *Lappeenranta-Lahti University of Technology, Finland*
OL25 16.10 – 16.30	**Energy management strategy and software design for shore power DC microgrid system.** Chang Liu[1], Yaozong Yu[2], Wanglin Ye[2], Xu Shungang[2], Bo Qu[1], Ping Yang[2] *1) China Electric Power Research Institute Co. Ltd, China, 2) Southwest Jiaotong University, China*


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Poster Session: 30OSP

Format: In-person (On-site)
Room: Exhibition Hall I
Date & Time: 30 November 2023, 14.50 – 16.30
Chair: Sreyam Sinha

P16	**Real-Time Initialization of Thermal Models of an Oil-Cooled Permanent Magnet Synchronous Machine.** Huihui Xu, Ahmadreza Tahan Nazif, Stephan Schüller, De Doncker Rik W. *RWTH University, Germany*
P17	**Comparative study of efficiency improvement with adjustable DC-link voltage powertrain using DC-DC converter and Quasi-Z-Source inverter.** Yu Xu[1], Anton Kersten[2], Pär Ingelström[3], Sepideh Amirpour[1], Simon Klacar[3], David Sedarsky[4] *1) China Euro Vehicle Technology AB, Sweden, 2) RISE Research Institutes of Sweden, 3) Infimotion Technology Europe AB, Sweden, 4) Chalmers University of Technology, Sweden*
P18	**State of Energy Based Secondary Control Scheme of Virtual Power Plant.** Gi-Hoon Kim, Yoon-Cheul Jeung, Gil Hyeon Kang, Kyoung-Soo Kang, Yeong-Jun Choi, Hee-sang Ko *Korea Institute of Energy Research & Jeju National University, Korea (South)*
P19	**Extended Characteristics of Grid-Forming Control: Seen from the Perspective of AC Power Supply.** Hao Luo[1], Yinxiao Zhu[1], Yongheng Yang[1], Huanhai Xin[1], Yinzhang Peng[2], Qingxi Duan[2], Zimin Zhu[2] *1) Zhejiang University, China, 2) State Grid Xinjiang Electric Power Research Institute, China*
P20	**Operational Flexibility of Grid-Connected Power Converters for Renewable Energy Integration.** Zhe Zhang[1], Yinxiao Zhu[1], Yongheng Yang[1], Yinzhang Peng[2], Qingxi Duan[2], Zimin Zhu[2] *1) Zhejiang University, China, 2) State Grid Xinjiang Electric Power Research Institute, China*

Poster Session: 30OSP (cont.1)

Format: In-person (On-site)
Room: Exhibition Hall I
Date & Time: 30 November 2023, 14.50 – 16.30
Chair: Sreyam Sinha

P21	**A New Light Load Efficiency Improving Scheme Utilizing SiC-MOSFET Features of Dynamic Gate Drive Threshold with Smart Driving Design for Phase Shift Full Bridge Converter.** Ching-Guo Chen, Wen-Nan Huang, Hsiang-Chi Meng, Tung-Ming Lai *Potens Semiconductor Corp, Taiwan*
P22	**Design Considerations for GaN-based Drive-train Inverters in Light Electric-Vehicles.** Rahul Bhujade, Jaydeep Saha, Sanjib Kumar Panda *National University of Singapore & Robert Bosch SEA pte ltd, Singapore*
P23	**Evaluation of Effect of Control Design on Bidirectional Dynamic Wireless Power Transfer.** Masahiro Misaka[1], Ryosuke Ota[2], Ryohei Okada[1], Nobukazu Hoshi[1], Daiki Satou[3], Hiroyasu Kobayashi[4] *1) Tokyo University of Science, Japan, 2) Tokyo Metropolitan University, Japan, 3) Tokyo Denki University, Japan, 4) Chiba University, Japan*
P24	**Time Based Adaptive Scheme for SiC-Based Totem Pole PFC and FBLLC Stage for Portable EV Charger Design with G2V/V2X Compatibility.** Saran Chaurasiya, Bhim Singh *Indian Institute of Technology, India*
P25	**Investigation of ToU and V2G to Accommodate High EV Penetrations in Power Distribution Grid.** Ugyen Chophel[1], Wijarn Wangdee[2] *1) Bhutan Power System Operator, Bhutan, 2) Chulalongkorn University*

Poster Session: 30OSP (cont.2)

Format: In-person (On-site)
Room: Exhibition Hall I
Date & Time: 30 November 2023, 14.50 – 16.30
Chair: Sreyam Sinha

P26	**An Ultrafast State-of-Health Monitoring Scheme for Li-ion Batteries Based on A Simple Electrical Model.** Yuan Mao[1], Junting Bao[1], Youbing Zhang[1], Yun Yang[2] *1) Zhejiang University of Technology, China, 2) Nanyang Technological University, Singapore*
P27	**Exploring Power Electronics Converters for Water Electrolysis in Microgrid Applications: A Comprehensive Overview.** *Milad Bahrami[1], Ehsan Jamshidpour[1], Navid Bayati[2], Serge Pierfederici[1]* *1) Université de Lorraine & GREEN Laboratory, France, 2) University of Southern Denmark, Denmark*
P28	**State of Health Battery Estimation by Using the OCPP of Charging Station Combined with Loss of EV Charging System.** *Pannawat Peanjad* *King Mongkut's Institute of Technology Ladkrabang, Thailand*
P29	**Optimizing Energy Management for Full-Electric Vessels: A Health-Aware Approach with Hydrogen and Diesel employing Equivalent Consumption Minimization Strategy.** Charlotte Löffler, Timon Kopka, Henk Polinder, Rinze Geertsma, Andrea Coraddu *Delft University of Technology, Netherlands*
P30	**Analysis of External Excited Synchronous Machine for EV Traction Considering Maximum Efficiency Control.** Byeong-Hwa Lee[1], Jae-Woo Jung[2] *1) Korea Automotive Technology Institute, Korea (South), 2) Daegu University, Korea (South)*

PEC TECHNOLOGY

ABOUT US

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Industry Session: 30IND1

Format: In-person (On-site)
Room: CGV1
Date & Time: 30 November 2023, 10.30 – 11.50
Chair: Uthane Supatti

IND7 10.30 – 11.10	**ALTAIR GLOBAL ACADEMIC PROGRAM AND PARTNERING WITH UNIVERSITIES IN ELECTRIFICATION PROGRAM** Satish Ramakrishna *Altair*
IND8 11.10 – 11.50	**EMC Noise Cancellation for New EV and HEV Applications.** Eakdanai Kavichai *Wurth Electronics Singapore Pte., Ltd., Singapore*

Industry Session: 30IND2

Format: In-person (On-site)
Room: CGV1
Date & Time: 30 November 2023, 13.00 – 17.00
Chair: Burin Kerdsup, Surapong Suwankawin

IND9 13.00 – 13.40	**ABB E-mobility is geared towards a sustainable future with net-zero emission.** WeeJin Lee *ABB Electrification (Thailand) Co., Ltd.*
IND10 13.40 – 14.20	**A Concept Design of an EV Charging Station with Photovoltaic System and Battery Energy Storage System, Industry Point of View.** Chanthawit Anuntasethakul *PEC Technology (Thailand) Co., Ltd., Thailand*
IND11 14.20 – 15.00	**Trends in Si/SiC/GaN based power device and module technologies and challenges.** Gourab Majumdar *Mitsubishi Electric Corporation, Japan*
IND12 15.00 – 15.40	**Novel automotive power unit with SiC chip.** Norbert Pluschke *Semikron Danfoss Co. Ltd., Hong Kong*
IND13 15.40 – 16.20	**DRIVING DECARBONISATION TOWARDS A SUSTAINABLE FUTURE Siemens bring Technology with Purpose to power Electric Fleets.** Arjun Raju K S *Siemens*
IND14 16.20 – 17.00	**Advanced electric motor testing trends: flux, NVH, drive cycles, and electrical noise immunity.** Mitchell Marks *HBK, Japan*

Industry Presentation - 7

Topic: ALTAIR GLOBAL ACADEMIC PROGRAM AND PARTNERING WITH UNIVERSITIES IN ELECTRIFICATION PROGRAM
Industry: Altair
Presenter: Satish Ramakrishna

Abstract

Altair is one of global leaders ever since founding in 1985 in simulation driven design with artificial intelligence, and machine learning, complimented by HPC and Data Science. We believe the convergence of simulation, data science, AI and ML will transform the world. And while this era of convergence is only beginning, today's students will grow up in a world where it'll be in full effect.

In this presentation, Altair will be sharing case studies from academic and industrial customers worldwide. Challenges in designing and developing EV components and system will be described e.g. shortened development cycle, standard compulsory, innovative and new features. We will present how they overcome these challenges by using our integrated and strong coupled multi-disciplinary simulation tools i.e. Mechanical, Thermal, CFD, Electromagnetic, Electrical, Power Electronics, Control, AI and ML.

Altair Global Academic Program helps prepare teachers and students alike for this coming transformation. Coupled with the obvious advantage of world class research and the revenue generation avenues because of expertise, is the inherent possibility of the embedding the practical technology in the undergraduate curriculum, hands-on projects and internship with Altair and our industrial partners. Altair and our academic partners are at the forefront of current and future technology, and with their assistance, we can give today's students the tools and skills to become tomorrow's innovators, ground breakers, and world-shakers.

Industry Presentation - 8

Topic: EMC Noise Cancellation for New EV and HEV Applications.
Industry: Wurth Electronics Singapore Pte., Ltd., Singapore
Presenter: Eakdanai Kavichai

Abstract

The rising electrification of motor vehicles is inevitably accompanied by an increase in electromagnetic interference. The use of cable ferrites can significantly reduce these in electric and hybrid vehicles, whether interference signals on lines or electromagnetic field coupling effects. High-performance inductive materials in cable ferrites significantly improve EMC performance. Standard ferrite cable core suppression elements in axial as well as toroidal form are suitable for a wide range of applications with medium and high frequencies. For higher frequencies, these contain a magnesium component. A very wide frequency range is covered by cable ferrites with a new nanocrystalline material (NC).

Wurth Electronics's cable ferrites are designed to work in all different frequency ranges with the best attenuation. It is essential for the following automotive applications: (1) in EMI suppression against inverter spikes; (2) attenuate EMI noise induced by the rotor of the electric motor; (3) minimize NVH (noise vibration harshness) in the EMC spectrum at power trains; and (4) provide special EMI suppression for junction box interconnections.

In this session, we will dive deeper into the world of cable ferrites to understand their functions and typical characteristics and show how to use REDEXPERT to select the most suitable cable ferrite.

REDEXPERT is Wurth Electronics's online platform for easy component selection, simulation, and design. It allows you to easily filter many technical product details and inspect the product performance in charts. This reduces the number of components needed to quickly find the most suitable part for your applications and conditions. You can go so far as, for example, to simulate your inductor losses for your DC-DC converter type. You can even design your EMI filter and get recommended parts directly from your input requirements.

Industry Presentation - 9

Topic: ABB E-mobility is geared towards a sustainable future with net-zero emission.
Industry: ABB Electrification (Thailand) Co., Ltd.
Presenter: WeeJin Lee

Abstract

Emission-free public transportation, such as electric buses, improves air quality and reduces noise pollution. However, electrifying the public transportation fleet comes with challenges, especially in choosing the right infrastructure to support the fleet's operational needs. During this session, ABB E-mobility will share smart technologies to help address these challenges while reducing operational costs. ABB has years of experience designing, manufacturing, installing, and maintaining electric vehicle charging infrastructure.

By success case on depots and public locations is Qatar, Mowasalat bus fleet installed EV charging infrastructure for over 1,000 buses to transport 50,000 passengers a day with 125 MW of charging capacity, 1,300 connectors for destination charging and 85 opportunity chargers. With this charging solution, the complete bus fleet can be charged overnight at the depots and while in use without impacting regular operations. Data connection to connect and integrate the infrastructure into the Fleet Management System for 24/7 fleet optimization.

Industry Presentation - 10

Topic: A Concept Design of an EV Charging Station with Photovoltaic System and Battery Energy Storage System, Industry Point of View.
Industry: PEC Technology (Thailand) Co., Ltd., Thailand
Presenter: Chanthawit Anuntasethakul

Abstract

In this presentation, we propose a concept design for an Electric-vehicle (EV) charging station with photovoltaic (PV) system and battery energy storage system (BESS). The key idea of this design is to offer a greener solution for EV charging stations that can sustain clean energy for both the stations and its nearby facilities. The MATLAB simulation is carefully conducted using energy balance equation and power balance equation for the PV system, BESS, EV charging station, and facility load. We utilize in-depth PV data from PVSYST, a well-known tool for PV system design. This not only enables us to assess the performance of the PV system but also facilitates proper sizing for the BESS. As results, we simulate the system operation, perform an analysis on carbon credit, and conduct a feasibility study in terms of yearly income, levelized cost of energy (LCOE), and internal rate of return (IRR).

Industry Presentation - 11

Topic: Trends in Si/SiC/GaN based power device and module technologies and challenges.
Industry: Mitsubishi Electric Corporation, Japan
Presenter: Gourab Majumdar

Abstract

In the power electronics application fields, the design and implementation of power converters are at a turning point amid rising global need for electrification various transportation means as well as consensus for energy saving to counter climate change issues.

Looking at the wide range of power electronic applications – from less than one-watt power needed for the operation of mobile phones up to 100s of mega-watt power needed for high-speed trains and high power rated application systems/equipment – all looking into power electronic potential for energy efficiency and sustainable reduction of CO2 emission in future systems.

Silicon (Si) IGBTs are at present the most widely used power semiconductors in most medium to high power conversion fields. However, this trend is increasingly showing signs of change with the appearance of wide-bandgap (WBG) devices, particularly the ones based on silicon carbide (SiC) and gallium nitride (GaN).

Since the middle of the 1990s power semiconductors started to evolve without being dependent solely on feature size refinement that has been the mainstream for LSIs (Large Scale ICs). The significant increase in electrical performance has come from the overall silicon utilization (vertical- & horizontal- structural optimization). Based on this trend the technology roadmap for power devices has followed a horizontal chip optimization, e.g., smaller feature size is translated into higher cell densities and new trench gate structures, and a vertical optimization to minimize the drift layer and reduce the bulk substrate material significantly. Chronologically power devices adhered with these technologies have helped to largely reduce the overall operation losses, increase the switching frequency and efficiencies of power conversion systems employed in or implemented by all major industries and services. Such mainstream technology development trends are continuing to be adopted to elevated performance-to-cost ratio of all key power devices (i.e., IGBTs, diodes of fast-recovery and Schottky types, MOSFETs and super-junction devices) either based on Si or SiC or GaN.

Furthermore, SiC and GaN power devices, including power modules, have been widely investigated for future power switching systems with high efficiencies. With the uprising need for electrifying vehicles in the automotive industry, the applicability potential of these new devices is being thoroughly investigated. So far, prototypes of practicable transistors using these wide-bandgap materials have demonstrated their performance superiority and great potential.

It is therefore of high interest to review the main features and the advantages of Si/SiC/GaN based power devices and modules and to identify the most used alternatives in the medium to high range power conversion systems e.g, EV/HEV powertrains, railway traction drives and air-conditioning. The aim of this presentation is therefore to give an overview of the trends the Si, SiC, GaN based power chip and module technologies are following to meet needs and practices of the abovesaid key industries. The presentation also covers the latest device technologies and future outlooks highlighting as well on challenges ahead to be solved.

Industry Presentation - 12

Topic: Novel automotive power unit with SiC chip.
Industry: Semikron Danfoss Co. Ltd., Hong Kong
Presenter: Norbert Pluschke

Abstract

SEMIKRON-Danfoss offer a new and fast way for customers to create their own, optimized motor-controller for industrial and off-highway vehicles and other battery-powered machinery. The SKAI 3 inverter platform (up to 98V and up to 950V battery voltage) is a new product concept, designed to quickly develop a customized automotive motor-inverter, without the effort of industrializing the overall mechanical power-electronics.

With the power-technologies typically only available for high-power application, this platform offers high-performance, high-reliability ready to use. With more than 1.5 million units from this product family installed in vehicles, the technology has demonstrated its capabilities and reliability.

The SKAI 3 (<950V) is equipped with the latest SiC power modules in a novel 3-D design which will strengthen the reliability. Weldable power terminals, low stray inductance and power density in a range of over 100kW per liter are only a view future which will explained.

Industry Presentation - 13

Topic: DRIVING DECARBONISATION TOWARDS A SUSTAINABLE FUTURE
Siemens bring Technology with Purpose to power Electric Fleets.
Industry: Siemens
Presenter: Arjun Raju K S

Abstract

The electrification of fleets is a pivotal step in our global journey toward sustainable transportation. Siemens, a pioneer in electrification solutions, is leading the charge with its comprehensive eMobility portfolio. In this session, we delve into Siemens' groundbreaking initiatives and solutions, and how they are poised to revolutionize the eMobility landscape by mitigating challenges faced by the industry, policy makers and society.

Siemens' eMobility solutions encompass the entire spectrum of fleet electrification. From charging infrastructure to fleet management software, our holistic approach ensures that fleets of all sizes and industries can embrace electrification seamlessly. We offer a range of chargers, from AC to DC, suitable for both light-duty and heavy-duty vehicles, ensuring that fleets can charge their EVs efficiently and quickly. The heart of Siemens' eMobility offering lies in its advanced charging infrastructure. Our smart charging stations are designed to meet the specific needs of fleets, enabling them to maximize the utilization of their EVs. With features such as load management, predictive maintenance, and dynamic pricing, Siemens' charging solutions ensure cost-effective and sustainable charging operations for fleet managers. Siemens Solutions are future-proof designed to adapt to the evolving needs of electric fleets and the ever-expanding EV landscape, fitting into the entire eMobility value chain right from the Grid Access point to the Energy Transfer cables to vehicles. Finally, we discuss success cases stretching from the US to EU to Asia.

Industry Presentation - 14

Topic: Advanced electric motor testing trends: flux, NVH, drive cycles, and electrical noise immunity.
Industry: HBK, Japan
Presenter: Mitchell Marks

Abstract

As motor and inverter technologies become more complex, testing is critical to implementation of these technologies. New machines require troubleshooting, validation, calibration, and optimization, which are time consuming and often require difficult calculations and significant processing. HBK has worked with companies in the automotive and aerospace industry to improve their testing quality and processes. This presentation will show the latest trends in flux measurement, drive cycles, torque ripple, noise and vibration, and Electrical Noise immunity.

PRESENTATION SCHEDULE ON 1 DEC 2023

Oral Presentations:	23	Presentations	Time: 09.00 – 12.30
Poster Presentations:	17	Presentations	Time: 09.00 – 10.40
Industry Presentations:	4	Presentations	Time: 09.00 – 11.40

Highlighted Sessions:

None

Oral Session: 01OS1
[THE FAULT-TOLERANT ARCHITECTURES AND CONTROL STRATEGIES 1]
Format: In-person (On-site)
Room: CGV2
Date & Time: 1 December 2023, 09.00 – 10.00
Chair: Noureddine TAKORABET

OS76 09.00 – 09.20	**Current Sensor Fault Tolerant strategy for a Wound Rotor Synchronous Machine.** Peyman Haghgooei[1], Sisuda Chaithongsuk[2], Ehsan Jamshidpour[3], Noureddine Takorabet[3], Lotfi Baghli[3] *1) Devialet Company, France, 2) Rajamangala University of Technology Suvarnabhumi, Thailand, 3) Université de Lorraine, France*
OS77 09.20 – 09.40	**Current sensor fault detection and compensation system for wound rotor synchronous motor based on neural networks.** Maciej Skowron[1], Krystian Teler[1], Peyman Haghgooei[2], Ehsan Jamshidpour[3],Teresa Orlowska-Kowalska[1] *1) Wroclaw University of Science and Technology, Poland, 2) Devialet Company, France, 3) Université de Lorraine, France*
OS78 09.40 – 10.00	**Comparison Between Reconfiguration Control Strategies for Fault-Tolerant Five-Phase Synchronous Machine.** Lotfi Baghli[1], Noureddine Takorabet[1], Phatiphat Thounthong[2], Ehsan Jamshidpour[1], Mohamed Azzi[1] *1)Université de Lorraine, France, 2) King Mongkut's University of Technology North Bangkok, Thailand*

Oral Session: 01OS2
[DESIGN, THERMAL MANAGEMENT, PACKAGING, AND OPTIMIZATION]
[WIRED AND WIRELESS CHARGING TECHNOLOGIES] and Related Topics
Format: In-person (On-site)
Room: CGV3
Date & Time: 1 December 2023, 09.00 – 10.20
Chair: Ryosuke Ota

OS79 09.00 – 09.20	**Thermal Characterization of Power Module with BCI-ROMs.** JungKyun Kim *Siemens, Korea (South)*
OS80 09.20 – 09.40	**Analytical loss model for single- and two-speed electric vehicle gearboxes.** Fabricio A. Machado, Phillip J. Kollmeyer, Ali Emadi *McMaster University, Canada*
OS81 09.40 – 10.00	**Analytically Optimized Asymmetric Coupler Design for Wireless Drone Charging with Receiver-side Weight Constraint.** Ronaq Nazir, Ayush Dixit, Sreyam Sinha *Indian Institute of Technology Delhi, India*
OS82 10.00 – 10.20	**A Single-Phase Direct AC-AC Wireless Power Transfer System Using Conduction Mode-Exchanged Pulse Density Modulation.** Guiyi Dong[1], Tomokazu Mishima[1], Hideki Omori[1], Lai Ching-Ming[2] *1) Kobe University, Japan, 2) National Chung Hsing University, Taiwan*
OS86 10.20 – 10.40	**Estimation of Permanent Magnet Demagnetization Using MRAS with no Sensitivity to Winding Resistance of IPM Motor.** Faiz Husnayain[1,2], Toshihiko Noguchi[2], Kiyohiro Iwama[2], Feri Yusivar[1], Budi Sudiarto[1] *1) Universitas Indonesia, Indonesia, 2) Shizuoka University, Japan*

Oral Session: 01OS3
[THE FAULT-TOLERANT ARCHITECTURES AND CONTROL STRATEGIES 2]
Format: In-person (On-site)
Room: CGV2
Date & Time: 1 December 2023, 10.50 – 11.50
Chair: Marif Daula Siddique

OS83 10.50 – 11.10	**Model Predictive-Position Sensorless Control of PMSM with Non-sinusoidal Back-EMF.** Sreejith Chakkalakkal, Aathira Karuvaril Vijayan, Babak Nahid-Mobarakeh *McMaster University, Canada*
OS84 11.10 – 11.30	**Improved Damping Control Based on Hamiltonian-Energy Function with State-Observer for Permanent Magnet Synchronous Motor Drives.** Thong-in Suyata[1], Pongsiri Mungporn[1], Burin Yodwong[1], Matheepot Phattanasak[1], Phatiphat Thounthong[1], Ehsan Jamshidpour[2], Noureddine Takorabet[2], Serge Pierfederici[2], Nicu Bizon[3], Ridtee Inteeworn[4], Babak Nahid-Mobarakeh[5], Apinun Gonmanee[6] *1) King Mongkut's University of Technology North Bangkok, Thailand, 2) Université de Lorraine, France, 3) University of Pitesti, Romania, 4) Provincial Electricity Authority, Thailand, 5) McMaster University, Canada, 6) Khon Kaen Technical College Institute of Vocational Education, Thailand*
OS85 11.30 – 11.50	**One-Loop Model-Free Torque Control of Permanent Magnet Synchronous Motor Drives.** Songklod Sriprang, S.[1], Apinya Siangsanoh[2] *1) Rajamangala University of Technology Rattanakosin, 2) University of Lorraine, France*

Oral Session: 01OL1
[MOTOR DRIVE 2]
Format: Online
Room: PT1
Date & Time: 1 December 2023, 09.00 – 10.40
Chair: Prasanth Sundararajan

OL26 09.00 – 09.20	**Open Circuit Fault Diagnosis of NPC Three-Level Inverter Based on Stator Voltage Errors.** Bo Liu[1], Yanfei Cao[1], Yan Yan[1], Chen Li[1], Tingna Shi[1], Guozheng Zhang[2] *1) Zhejiang University, China, 2) Tiangong University, China*
OL27 09.20 – 09.40	**Performance Analysis of 2.4KW CLLC Resonant Dual Active Bridge Converter with Different Phase Shift Modulation Techniques for EV Charging Applications.** Anbuselvi Sv, Brinda R, Sripriya B, Kumudini Devi R P *Anna University, India*
OL29 09.40 – 10.00	**Design and Optimization of Permanent Magnet Linear Synchronous Motor for Direct Drive Multi-car Elevator Variable Rail System.** Dongqing Yang *Henan Polytechnic University, China*
OL30 10.00 – 10.20	**Adaptive integral-type second-order nonsingular terminal sliding mode control of permanent magnet linear synchronous motor.** Xiuping Wang[1], Zhipeng Dong[1], Nan Wang[2] *1) Shenyang Institute of Engineering, China, 2) State Grid Liaoning Electric Power Company, China*

Oral Session: 01OL2
[MISCELLANEOUS TOPICS 1]
Format: Online
Room: PT1
Date & Time: 1 December 2023, 10.50 – 12.30
Chair: Chanyut Karnjanapiboon

OL31 10.50 – 11.10	**Robust Optimization of Smart Apartment Building with Uncertainty in Photovoltaic Output and Load.** Shinya Yamamoto[1], Masahiro Furukakoi[2], Narayanan Krishna[3], Ashraf M. Hemeida[4], Hiroshi Takahashi[5], Tomonobu Senjyu[1] *1) University of the Ryukyus, Japan, 2) Sasebo College, Japan, 3) SASTRA Deemed University, India, 4) Aswan University, Egypt, 5) Fuji Electric Co., Ltd., Japan*
OL32 11.10 – 11.30	**Operation of a Series Resonant Converter as a Dual-Gain DC-Transformer.** Pramod Milind Apte[1], Jens Friebe[2] *Leibniz University Hannover, Germany, 2) University of Kassel, Germany*
OL33 11.30 – 11.50	**Design of Horizontally Aligned Six-Plate Capacitive Power Transfer for EV Charging Applications.** Pramod Patidar, Himanshu Jain *Indian Institute of Technology Roorkee, India*
OL34 11.50 – 12.10	**A Simple Clamping Method to Suppress Switching Oscillation for SiC MOSFET.** Jian Chen, Song Wensheng, Hao Yue, Jianping Xu *Southwest Jiaotong University, China*
OL35 12.10 – 12.30	**Stereo Vision-based Turn-Alignment Optimization for Wireless Power Transmission Positioning.** Panudech Tipauksorn, Jutturit Thongpron, Kisda Yingkayun, Prasert Luekhong, Uthen Kamnarn, Anon Namin *Rajamangala University of Technology Lanna, Thailand*

Oral Session: 01OL3
[MISCELLANEOUS TOPICS 2]
Format: Online
Room: CGV4
Date & Time: 1 December 2023, 09.00 – 10.00
Chair: Andrea Coraddu

OL36 09.00 – 09.20	**Control of Three-Level PWM Inverter-Fed Induction Motor Drives.** Sutthimat Mueangngoen, Neerakorn Jarutus, Yuttana Kumsuwan *Chiang Mai University, Thailand*
OL37 09.20 – 09.40	**Increasing Hosting Capacity for Electric Vehicles in Unbalanced Distribution Systems by Three-Phase Step Voltage Regulators.** Akito Nakadomari[1], Masahiro Furukakoie[2], Shriram Srinivasarangan Rangarajan[3], Edward Randolph Collins[4], Hiroshi Takahashi[5], Tomonobu Senjyu[1] *University of the Ryukyus, Japan, 2) National Institute of Technology Sasebo College Nagasaki, Japan, 3) Enerzinx India Private Limited, India & Department of Electrical and Computer Engineering, Clemson University, USA, 4) Clemson University, USA, 5) Fuji Electric Co., Ltd, Japan*
OL38 09.40 – 10.00	**A Model-Based Evaluation of Wave Collision Effects on the Multi-Objective Optimization of Hybrid Ships Sizing.** Saman Nasiri, Henk Polinder *Delft University of Technology, The Netherlands*

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Poster Session: 01OSP

Format: In-person (On-site)
Room: Exhibition Hall I
Date & Time: 1 December 2023, 09.00 – 10.40
Chair: Supakit Kawdungta

P31	**Mass-Specific Thermal Optimization of a Heat Sink for rotating 80kW SiC Dual Inverter Exposed to Extreme Conditions.** Tehmina Ambreen, Kais Atallah, Milijana Odavic *University of Sheffield, United Kingdom (Great Britain)*
P32	**A Novel Compound Hybrid Flux Machine Towards Electric Vehicle Traction.** Zaixin Song, Yongtao Liang, Yujie Chen *The Hong Kong Polytechnic University*
P33	**Torque ripple Reduction of IPMSM Applying 2-step Magnetic skew.** Jae-Woo Jung, Dong-Su Kim *Daegu University, Korea (South)*
P34	**Adaptable EV DC charger station design using matrix switch network with series connection.** KwokWai Ma *Infineon Technologies Asia Pacific Pte Ltd, Singapore*
P35	**Ultra-High-Power-Rate PM Motor with Double Stator Structure.** Koma Sugiura, Toshihiko Noguchi *Shizuoka University, Japan*

Poster Session: 01OSP (cont.1)

Format: In-person (On-site)
Room: Exhibition Hall I
Date & Time: 1 December 2023, 09.00 – 10.40
Chair: Supakit Kawdungta

P36	**Multi-objective Geometric Optimal Design of Industrial High-Voltage Induction Motor for Cost Reduction.** Chang Eob Kim[1], Min-Seok Kim[2], Sang-Hoon Lee[2], Hyoung-Jun Moon[3] *1) Hoseo University, Korea (South), 2) Jaewoo Tech Co., Ltd, Korea (South), 3) Hyosung Heavy Industries, Korea (South)*
P37	**Design and Comparison of High-speeds PMSM and IM for Aircraft Application.** Larbi Dahnoun[1, 2], Julien Fontchastagner[1], Christophe Viguier[2], Smail Mezani[1], Noureddine Takorabet[1] *1) Université de Lorraine, France, 2) Safran Tech, France*
P38	**A Conversion and Test Results of Slotted to Slotless Brushless DC Motors.** Theeraphong Srichiangsa[1], Sirichai Wattanasophon[2], Sarinee Ouitrakul[1], Kiatiyuth Kveeyarn[1] *1) Kasetsart University, Thailand, 2) Kasetsart University Siracha Campus, Thailand*
P39	**Design and Characteristic analysis for the Hybrid Excitation Doubly Salient Generator with Separated Windings.** MengYao Wang, Baoquan Kou *Harbin Institute of Technology, China*
P40	**Genetic Algorithm Enabled Multi-Objective Design Optimization of Current Source Converters for Turboelectric Aircraft Propulsion.** Benjamin Luckett, Jiangbiao He *University of Kentucky, USA*

Poster Session: 01OSP (cont.2)

Format: In-person (On-site)
Room: Exhibition Hall I
Date & Time: 1 December 2023, 09.00 – 10.40
Chair: Supakit Kawdungta

P41	**Study of Direct Torque Control during Turns for Electric All-Terrain Vehicles with Two-Wheel Independent Drives.** Satit Owatchaiphong, Rachain Saita, Narong Thumputi *King Mongkut's University of Technology North Bangkok, Thailand*
P42	**Motor Permanent Magnet Temperature estimation based on Neural Network.** Yoonmo Sung[1], Sangmin Kim[2] *1) Electric Powertrain & Hyundai Mobis, Korea (South), 2) Electric Powertrain Lab, Korea (South)*
P43	**A Guideline on PV-Battery Sizing of RE100 Microgrid in Building.** Phimnaphat Phonthani, Surapong Suwankawin *Chulalongkorn University, Thailand*
P44	**Development of SiC Inverter for In-Wheel Motor Driving.** Pooreum Jang, Byong Jo Hyon, Dongmyoung Joo, Dae Yeon Hwang, Jin-Hong Kim *Korea Electronics Technology Institute, Korea (South)*
P45	**The Development of Inverter for Electric Propulsion System UAM using Wide-Bandgap Components.** Jin-Hong Kim, Pooreum Jang, Hyoung-Kyu Yang, Yong-Su Noh, Joon Sung Park *Korea Electronics Technology Institute, Korea (South)*

Poster Session: 01OSP (cont.3)

Format: In-person (On-site)
Room: Exhibition Hall I
Date & Time: 1 December 2023, 09.00 – 10.40
Chair: Supakit Kawdungta

P46	**Resynchronization of Grid-Forming Inverter -Stability Analysis and Design Guidelines-.** Nuttakit Kijshevavithaya, Surapong Suwankawin *Chulalongkorn University, Thailand*
P47	**An Implementation of Fault-Current Boosting Technique for Inverter-Based Renewable Energy.** Preenapan Panya, Surapong Suwankawin *Chulalongkorn University, Thailand*


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Industry Session: 01IND1

Format: In-person (On-site)
Room: CGV1
Date & Time: 1 December 2023, 09.00 – 11.40
Chair: Chonlatee Photong, Uthane Supatti

IND15 09.00 – 09.40	**Innovations in HIL Technologies to test and validate complex Power Electronics Applications.** Marcus Lim *Genetron Corp & Typhoon HIL, Singapore*
IND16 09.40 – 10.20	**Safe DC charging with insulation monitoring device.** Saprang Wisuthipanich *Simplify Engineering Co., Ltd., Thailand*
IND17 10.20 – 11.00	**Overview of Electrical Drive Design and Testing System for Electric Vehicles in Thailand.** Burin Kerdsup *National Electronics and Computer Technology Center, Thailand*
IND18 11.00 – 11.40	**Data Driven with Realistic Sensor Simulation for Autonomous (AD) and Advanced Driver Assistant (ADAS) Function Development and Validation.** Likhit Saengaroon *P G Intergroup Co., Ltd (Thailand)*

Industry Presentation - 15

Topic: Innovations in HIL Technologies to test and validate complex Power Electronics Applications.
Industry: Genetron Corp & Typhoon HIL, Singapore
Presenter: Marcus Lim

Abstract

Hardware-in-loop (HIL) has become an integral tool in the design and simulation of power electronics and systems. This talk focuses on the innovations in HIL technologies that tap on the power of reconfigurable FPGAs to greatly expand the processing capabilities, allowing the simulation of complex converters and large-scale systems to an extremely high degree of fidelity.

Industry Presentation - 16

Topic: Safe DC charging with insulation monitoring device.
Industry: Simplify Engineering Co., Ltd., Thailand
Presenter: Saprang Wisuthipanich

Abstract

As the number of electric vehicles on the roads continues to grow, so does the infrastructure required to ensure that finding a charging station or charging point and charging the vehicle in a fast and safe way is not a problem. DC charging stations are the means of choice when it comes to charging electric vehicles within a short period of time.

The aim is to be able to charge electric vehicles at any socket-outlet. This means different network types and protective measures can come together during the charging process. This requires careful coordination and implementation in order to guarantee comprehensive electrical safety for the user.

A distinction is made between different charging modes. The most common charging mode is AC charging. Since most of the vehicles provide a maximum AC charging power of 11 kW, it is often the case that charging a car requires a very long time. DC charging stations are the means of choice when it comes to charging electric vehicles within a short period of time.

In order to guarantee the electrical safety of the charging circuit, it is set up as an unearthed DC power supply system (IT system) according to IEC 61851-23. The maximum controlled charging power in DC-low mode is 50 kW to 170 kW and in the future up to 350 kW with up to 1,000 V.

During the charging process, an insulation monitoring device (IMD) monitors the entire charging circuit in the charging station as far as the electric vehicle. The IMD in the vehicle must be deactivated during this process. By principle, the insulation monitoring device is connected between the live supply conductors and earth and superimposes a measuring voltage Um. In the event of an insulation fault, the insulation fault RF closes the measuring circuit between the system and earth, generating a measuring current Im that is proportional to the insulation fault. This measuring current generates a corresponding voltage drop at the measuring resistance Rm, which is evaluated by the electronics. If this voltage drop exceeds a specific value equivalent to the under shooting of a specific insulation resistance, a signal will be output. As prescribed measuring principle which enables them to monitor both symmetrical and asymmetrical deteriorations in insulation. Insulation fault for plus or minus of DC power supply will be monitored and identified.

The isoCHA425HV IMD from Bender has been specifically developed for use in DC charging stations. For insulation monitoring in vehicles, Bender offers IR155 series IMDs. These devices use a measurement method that is adapted to the frequent and fast load changes in passenger cars or commercial vehicles, thus avoiding false tripping.

Industry Presentation - 17

Topic: Overview of Electrical Drive Design and Testing System for Electric Vehicles in Thailand.
Industry: National Electronics and Computer Technology Center, Thailand
Presenter: Burin Kerdsup

Abstract

Due to the concern of CO2 emission in a transportation sector, the development of electric vehicles (EVs) has gained an interesting widely. Several countries have initiated policies to promote electric vehicles. In Thailand, the government has set National EV Policy Committee to drive an EV roadmap. In 2030, thirty per cent of all vehicles made in Thailand will be electric vehicles. An electrical drive system, which consists of an electric motor and an inverter, is one of main components in a powertrain. These two parts are significantly affected to the overall performance of EV system and are suspicious to easily get a harmful thermal stress due to a bad quality of cooling system. Therefore, the design and testing system of an electrical drive is a crucial issue to strongly get attention. This presentation illustrates an overview of an electrical drive design and testing system for EVs in Thailand. Firstly, the design procedure of the electrical drive will be presented. All necessary tools of each step will be introduced. Next, the testing system comprising a machine characteristic test, a performance test and a Noise, Vibration and Harshness (NVH) test is explained. These facilities available at Sustainable Manufacturing Center (SMC) will enhance the development of an electrical drive for electric vehicles in Thailand. Finally, some case studies will be presented, especially the design of an electrical drive for a light electric vehicle which has been developed in Thailand.

Industry Presentation - 18

Topic: Data Driven with Realistic Sensor Simulation for Autonomous (AD) and Advanced Driver Assistant (ADAS) Function Development and Validation.
Industry: P G Intergroup Co., Ltd (Thailand)
Presenter: Likhit Saengaroon

Abstract

Using real recording data for the development of Autonomous (AD) and Advanced Driver Assistant (ADAS) Functions and Validation is more expensive and time consumption. How much data needs to be used and have enough scenario data?

To accelerate the development process, the digital twin or synthesis of the sensor data plays an important role.

The goal of this presentation is to give an overview of Data Driven Development and Realistic Sensor Simulation AD/ADAS development and Validation, which is described below.

- Overview of Data Driven Development Process for Autonomous (AD) and Advanced Driver Assistant (ADAS) Simulation.
- How to create a Vehicle and Sensor Digital Twin Model.
- AD/ADAS Function Development and Validation Regarding Functional Safety Standard.


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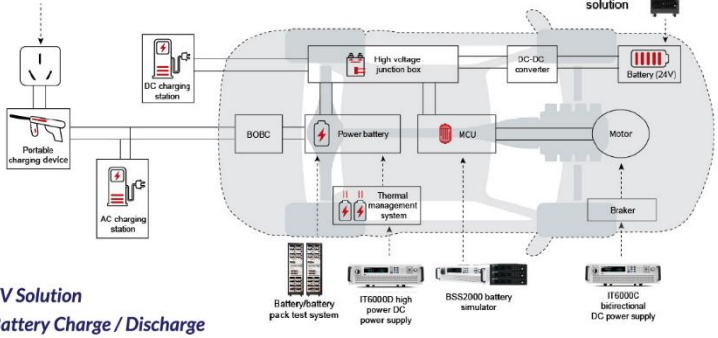

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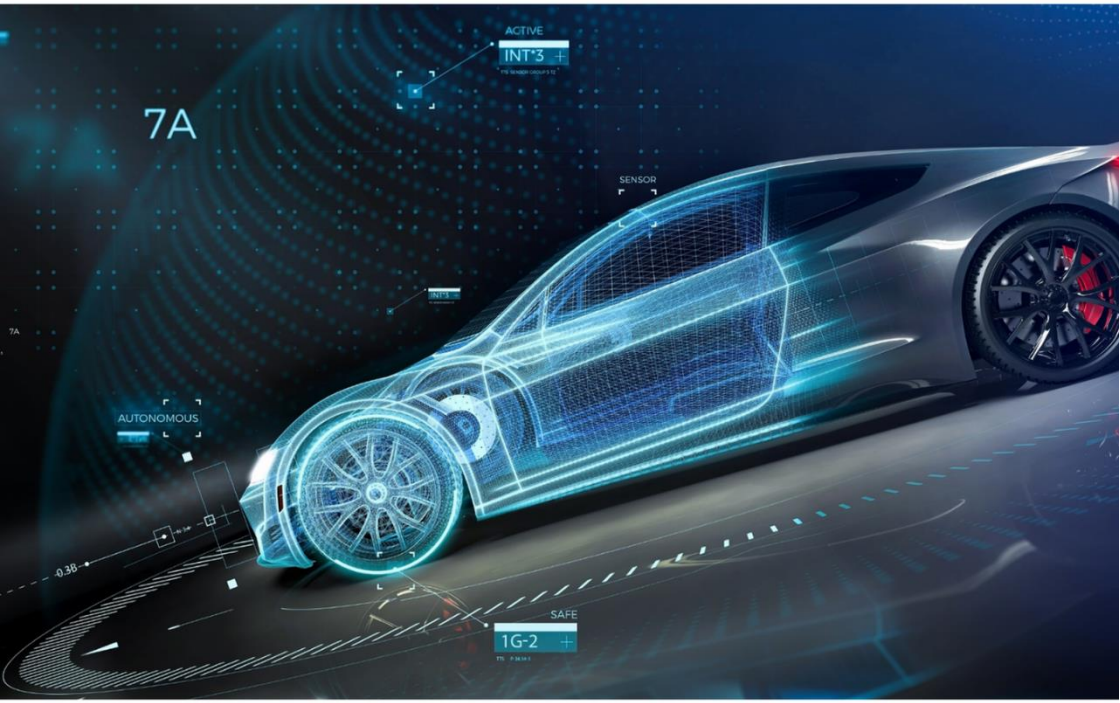

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