IEEE Industrial Electronics Society

IEEE

June 20 – 23, 2025 | Toronto, Canada

Program Book

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CITY OF TORONTO

MESSAGE
FROM THE MAYOR

It is my pleasure to welcome everyone attending the 34th International Symposium on Industrial Electronics (ISIE 2025).

This year's symposium will bring together experts, researchers and professionals in the field of industrial electronics for networking and knowledge exchange opportunities.

I am pleased this conference is taking place in Toronto. I hope everyone enjoys summer in our city and explores its vibrant neighbourhoods, as well as my favourite place to visit in the summer: the Toronto Islands.

On behalf of Toronto City Council, please accept my best wishes for an informative and enjoyable event.

Yours truly,

Olivia Chow
Mayor of Toronto

City Hall, 100 Queen Street West, 2nd Floor, Toronto, Ontario M5H 2N2
416-397-CITY (2489) mayor_chow@toronto.ca

Welcome Message from the Chairs

Dear Esteemed Colleagues and Friends,

We are thrilled to welcome you to the 34th International Symposium on Industrial Electronics (ISIE), taking place from **June 20 to 23, 2025**, at the **Second Student Centre, York University, Toronto, Canada.** It is an honor to have you join us for this landmark event.

Toronto, a city celebrated for its architectural brilliance and cultural richness, stands as the perfect backdrop for the Symposium. Known for its pioneering spirit in industrial innovation and technology, Toronto is home to groundbreaking research institutions and is a hub for advancements in manufacturing, electronics, renewable energy, and automation. With easy access through Toronto Pearson Airport, and a comprehensive public transportation system our attendees have a memorable and seamless experience.

As we celebrate research advancements, collaboration, and innovation, ISIE 2025 marks a significant milestone. From smart grids and power electronics to robotics and artificial intelligence, the field of industrial electronics continues to evolve, and this Symposium serves as a platform to showcase and discuss these transformative developments.

Our program is designed to foster knowledge exchange and networking, featuring esteemed keynote speakers, plenary panel discussions, technical sessions, industry talks, and workshops. We encourage you to engage actively with fellow attendees, share your insights, and explore the diverse range of topics on offer.

We extend our deepest gratitude to the organizing committee, the IEEE Industrial Electronics Society, and our sponsors for their unwavering support and commitment to making this Symposium a success.

We look forward to a stimulating and memorable event and to celebrating the 34th anniversary of ISIE with you.

Warmest regards,

Sheldon Williamson, Milos Manic, Kamal Al-Haddad, Makoto Iwasaki, and Huijin Gao
General Co-Chairs, ISIE 2025

Friday, 20 June 2025

14:00-15:30	*Room 344* **Tutorial 1: Enhancing Dependability in Cyber-Physical Renewable Energy Systems - Dr. Youmin Zhang, Hamed Badihi** Cyber-physical renewable energy systems (RESs), comprising wind turbines, solar photovoltaic (PV) arrays, and batteries integrated into microgrids, form the backbone of the next-generation electricity grid, commonly referred to as the “smart grid.” Enhancing the dependability (safety, security, reliability, availability, and resilience) of these RESs, both on the physical and cyber fronts, demands innovative approaches for physical-faults and cyber-attacks monitoring and fault-tolerant and attack-resilient control. Despite their distinct origins, both faults and cyber-attacks can have comparable consequences, leading to increased operating costs, physical damages, and potential cascading failures. Swift identification and differentiation of these incidents are essential to implement timely corrective actions and limit system damages. This tutorial focuses on the critical importance of early detection, diagnosis, and mitigation of physical-faults and cyber-attacks in cyber-physical RESs and microgrids to facilitate their dependable operation towards a future goal of electrification for resilient and decarbonized systems and communities fighting with climate change and global warming. Recent advancements in digitalization and the Industrial Internet of Things (IoT) have enabled robust intrusion detection and cyber-attack mitigation countermeasures, offering unprecedented advantages. Moreover, the tremendous computational power available in modern computers has propelled artificial intelligence (AI) and advanced machine learning capabilities to new heights. Leveraging these developments, we can efficiently convert vast and multidimensional sensor data into valuable insights, enabling intelligent monitoring and reliable control of energy and power systems. Chairs: Valeriy Vyatkin
14:00-18:00	*Registration* **Registration**
15:45-17:15	*Room 302* **Tutorial 2: Cybersecurity for Intelligent Transportation System: Foundations, Trends, and Opportunities- Prof. Max Mauro Dias Santos** The increasing adoption of Connected, Autonomous, Shared, and Electric (CASE) vehicles has introduced complex challenges in ensuring the cybersecurity of Intelligent Transportation Systems (ITS). The interplay between physical components, communication networks, and digital interfaces within automotive systems creates a vast and intricate attack surface for adversaries to exploit. Addressing these challenges requires a comprehensive understanding of industry standards, processes, methods, and tools for cybersecurity. This tutorial provides an in-depth exploration of cybersecurity foundations, trends, and opportunities for ITS, with a focus on CASE vehicles. Participants

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will learn about the underlying technologies, including Electronic Control Units (ECUs), communication protocols (CAN, Automotive Ethernet, FlexRay), and application protocols (SOME/IP, DoIP, AVB/TSN). The tutorial emphasizes privacy and security considerations, adherence to standards like ISO 26262 and ISO 21434, and best practices outlined in SAE J3061, UNECE WP.29, and ENISA guidelines.

The workshop will also delve into cutting-edge methods, including Artificial Intelligence (AI)-driven approaches to cybersecurity, dataset generation, penetration testing techniques, and the application of Autosar Secure Onboard Communication (SecOC) and IDS/IPS technologies. By integrating theory with practical demonstrations, participants will acquire actionable insights and strategies to safeguard ITS architectures.
Chairs: Valeriy Vyatkin

Room 338

Tutorial 3: Application of Machine Learning in Electric Motors; Design, Control, Condition Monitoring, Practical Solutions - Dr. Babak Nahid-Mobarakeh, Arta Mohmmad-Alikhani

Electric motors are widely used in different industries, including transportation, energy, manufacturing, and robotics. Their performance and reliability are especially critical in sensitive applications such as aerospace, medical devices, and high-precision industrial processes. Traditionally, ensuring optimal efficiency, control, and effective fault detection in electric motors has relied on inaccurate or computationally expensive approaches. However, with advancements in computational power and data availability, machine learning (ML) has emerged as a transformative tool for enhancing motor design, control, and condition monitoring.

This tutorial explores the application of ML techniques in electric motors and focuses on three key areas: design, control, and condition monitoring.

In motor design, ML-based optimization techniques, such as deep learning and surrogate modeling, enable efficient exploration of design parameters, reducing development time while improving performance and energy efficiency. ML models can predict complex electromagnetic, thermal, and mechanical behaviors that are otherwise difficult to model accurately using traditional model-based methods. Additionally, ML facilitates automated design-space exploration, accelerating innovation in high-performance motor development.

For control strategies, ML enhances adaptive and intelligent control techniques and overcomes the limitations of conventional PI and model predictive control (MPC) approaches. Reinforcement learning (RL) and deep learning-based controllers improve the dynamic response of electric motors by learning from operational data and adapting to changing conditions in real-time. Since electric motors have nonlinear behavior and performance variations under different operating conditions, ML-based observers can estimate critical state variables, such as speed and torque, addressing challenges in accurate state estimation. Moreover, ML techniques assist in

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	parameter estimation, which is traditionally difficult due to the inherent nonlinear characteristics of electric motors operating under variable conditions. These advancements contribute to enhanced precision, reduced energy consumption, and robust control solutions for applications such as robotics, electric vehicles, and industrial automation. In condition monitoring and fault detection, data-driven techniques have proven superior to traditional signal-based and model-based approaches. ML methods, including deep neural networks, convolutional neural networks, and classical ML algorithms, can identify fault patterns and anomalies in motor signals, enabling early detection of failures such as bearing wear, rotor asymmetry, and winding insulation degradation. Additionally, ML-driven predictive maintenance strategies can estimate motors' remaining useful life (RUL), preventing unexpected failures and minimizing downtime. This tutorial will provide practical insights into these applications and will show real-world case studies and industrial implementations. Attendees will gain a comprehensive understanding of how ML techniques transform electric motor technology, with discussions on algorithm selection, dataset preparation, feature engineering, and model deployment. The session will highlight emerging trends, such as hybrid physics-informed ML models, edge AI for real-time condition monitoring, and federated learning for collaborative motor diagnostics. Chairs: Abraham Marquez Alcaide
18:00-20:00	*Lunch Area* **Welcome Reception - Level 1**
Saturday, 21 June 2025	
08:00-08:30	*Main Auditorium* **Opening Ceremony**
08:00-18:00	*Registration* **Registration**
	Speaker Room **Speaker Room**
08:30-09:00	*Main Auditorium* **Keynote 1: Influence of Power Electronic Controls on Grid Stability - Jean Belanger, Opal RT (Virtual)** Abstract Power grid performance and stability are significantly impacted by the rapid integration of power-electronic-based renewable energy systems, as well as by HVDC systems and FACTS. This presentation will demonstrate that as the share of inverter-based power conversion systems increases relative to conventional machines, slow conventional machine rotor angle oscillations are increasingly replaced by fast control system instabilities. As modern power electronic control and protection systems operate at ever-increasing speeds, detailed unbalanced electromagnetic models rather than simpler

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	balanced RMS models are essential for accurately assessing overall system dynamic stability and its ability to return to stable conditions following large disturbances. Additionally, most manufacturers protect their intellectual property (IP) by providing plant owners and utilities with black-box encrypted real-code models. This creates new challenges in model interoperability and parameter optimization, as the full model details are not accessible. This paper will present HYPERSIM, a high-performance parallel EMT simulation software capable of evaluating the transient stability of large power grids integrating multiple HVDC, FACTS, and inverter-based resources (IBRs) simulated with OEM real-code models. Furthermore, the latest advancements in FPGA-based simulation for ultra-fast power electronic systems will also be discussed. Bio Jean Bélanger is the Co-Founder, CEO, and CTO of OPAL-RT TECHNOLOGIES, a global leader in real-time digital simulation for power systems, power electronics, and control systems. Since founding OPAL-RT in 1997, he has pioneered state-of-the-art real-time simulators used across industries, from hybrid vehicles and electrical aircraft to microgrids and large-scale power systems. He holds an Electrical Engineering degree from Laval University (1971) and a Master's from École Polytechnique de Montréal. Before OPAL-RT, he worked at Hydro-Québec's System Planning Division and IREQ, contributing to the 765-kV James Bay transmission system and real-time simulator development. A Fellow of the Canadian Academy of Engineering, Jean remains committed to making high-end real-time simulation tools accessible to engineers, scientists, and students by leveraging off-the-shelf PC technology. His work continues to drive innovation in electrification, energy systems, and industrial automation.
09:00-09:30	*Main Auditorium* **Keynote 2: Smart Grids and AI: The Power Couple We Deserve? - Dr. Tarlochan Sidhu, Ontario Tech University** Abstract The quest for sustainable energy and decarbonization has pushed modern power systems to their limits, demanding smarter, more adaptable solutions. Enter artificial intelligence (AI), the flashy new partner to traditional power grids. With its perceived ability to optimize operations, forecast demand, manage distributed energy resources, and enhance system efficiency, AI promises to transform smart grids into something truly revolutionary. But every power couple has its issues. Critics question the scalability, reliability, and long-term feasibility of AI-driven solutions, while ethical and operational concerns cast a shadow over its deployment. This talk will explore whether AI and smart grids are truly the power couple we deserve or just another mismatched duo. Drawing on insights from three research projects, we will dive into the real-world applications of AI, including its role in grid protection, cybersecurity, and asset management. While the results highlight AI's potential to boost smart grids, they also reveal the hurdles that must be overcome for this partnership to truly shine. Are AI and smart grids a match made in technological heaven or just a transitory spark? Let us find out. Bio Dr. Tarlochan Sidhu holds a B.E. (Hons.) from Thapar Institute of Engineering,

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	India, and M.Sc. and Ph.D. degrees from the University of Saskatchewan, Canada. From 1990 to 2002, he was a Professor and Graduate Chair at the University of Saskatchewan's Department of Electrical Engineering. He then served as Professor and Chair of the Electrical and Computer Engineering Department at the University of Western Ontario until 2011, where he also held the NSERC/Hydro One Networks Senior Industrial Research Chair in Power Systems Engineering. Since 2012, Dr. Sidhu has been a Professor at Ontario Tech University, where he was Dean of the Faculty of Engineering and Applied Science from 2012-2020. Dr. Sidhu has published over 300 papers, holds several international patents, delivered numerous invited talks, and provided consulting services to power industries worldwide. A recognized expert in smart grids, substation automation, and microgrids, he has supervised more than 50 Ph.D.s, Master's, and post-doctoral students. He has contributed technical leadership to international working groups, including IEEE's Power System Relaying Committee (PSRC) and CIGRE (France), and has helped develop international standards and guides for smart grids and substation automation. His contributions have earned him multiple awards, including the IEEE PSRC Distinguished Service Award in 2011. Dr. Sidhu is the Founding Editor-in-Chief of the International Journal of Emerging Electric Power Systems. He has served on the editorial boards of journals such as IEEE Transactions on Power Delivery and Electric Power Systems Research. He is a Fellow of several prestigious institutions, including the IEEE, the IET (U.K.), and the Canadian Academy of Engineering, and is a Registered Professional Engineer in the Province of Ontario and a Chartered Engineer in the U.K.
09:30-10:15	*Main Auditorium* **Industry Panel Session 1 - An Overview of Inverter-based Resources (IBRs) Deployment in Electric Grids: Current Status and Future Trends (Omid Alizadeh)** Omid Alizadeh, Senior Advisor, Quanta Technology, Canada. (Moderator) Ahmad Momeni, Director of Technology Testing, Advanced Technology Integration, Canada. Sébastien Cense – Director, FPGA Simulation Department, Opal RT, Canada Outline: The urgent requirements for decarbonization and continued environmental concerns is a driver for deployment and integration of inverter-based resources (IBRs) in power transmission and distribution systems. IBRs could present in various forms and interconnection levels and can contribute to grid resiliency and higher penetration of clean energy resources. However, streamlining design, integration, and testing process, depending on type and use case of IBRs, is still a continued discussion in the industry. The key challenges in IBR development practices will be described further, and a few examples of practical processes and solutions to address these challenges will be presented. The panellists will cover the following topics in detail: • Deployment of IBRs in Electric Grid T&D Systems: Engineering and Testing • Microgrids and Battery Energy Storage Systems: Design and Integration The speakers in this panel session will talk about their first-hand work experiences and the practical learnings they have gained through recent IBR projects. A few examples and insights are shared with the session attendees. Chairs: Michel Condry, Varaprasad Oruganti
10:00-18:00	

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Exhibiton Hall

Exhibition Level 1

10:15-10:30

Lunch Area

Coffee Break 1 - Exhibition Hall

10:30-12:00

Room 302

Technical Track 03 - Power Systems, Renewable Energy Systems and Smart Grid I

Chairs: Joao Martins, Amjad Anvari-Moghaddam

- **A Novel Phase Detector for High-Performance Single-Phase PLLs** *Yacine Triki, Ali BECHOUCHE, Hamid Seddiki, Djaffar OULD ABDESLAM*
- **Balanced Cooling System for Hardware Circuits in Reconfigurable Battery Module** *yikai zhang, Hong Qin, Xiaoshuang Li, Chang Liu, Jiasheng Xu, Guozhu Chen*
- **A Novel Optimal Placement of Multi-Type Sensors for Smart Grids Observability Using an Enhanced Graph Theory Search Algorithm** *Ahmed Sayed, Hany E. Z. Farag*
- **Harmonic Characteristics and Model Analysis for Distributed Photovoltaic Systems Based on Field Measurement Data** *Shuhan Yu*
- **GAF-TCN NILM: A Novel Approach to Non-Intrusive Load Monitoring Using Image Analysis with Gramian Angular Field and Temporal Convolutional Networks** *Mohammad Kaosain Akbar, Manar Amayri, Nizar Bouguila*
- **Enhancing Energy Flexibility Balancing User Needs and Constraints** *Joao Martins, João Bento, Pedro Pereira, Vitor Pires, Noman Shabbir, Rui Amaral Lopes*

Room 344

Special Session 11 - Theory and Technologies on Human Factors in Advanced Human-System Environment

Chairs: Daisuke Chugo, Mihoko Niitsuma

- **Boundary Setting using Permanent Magnets for Robotic Lawn Mower** *Masato Arai, Sho Yokota, Akihiro Matsumoto, Daisuke Chugo, Hiroshi Hashimoto*
- **Development of Intelligent Partition Pole** *Kazuma Kurosaki, Sho Yokota, Akihiro Matsumoto*
- **Proposal for standing assistance procedures using the spatial characteristics of standing motions of the elderly that correspond to the remaining muscle strength of each individual** *Daisuke Chugo, asai haruki, Misaki Kanno, satoshi muramatsu, Ken-ichi Tabei, Jinhua She, Hiroshi Hashimoto*
- **Navigation of Autonomous Electric Wheelchairs in Crowded Environments Using Pedestrian Activity Patterns and Dominant Moving Directions** *Takuya Kojima, Mihoko Niitsuma*
- **Walkers mechanical key characteristics** *Dunai Larisa, Sui Liang, Isabel Seguí Verdú, Daswin de Silva*
- **Machine Learning-Based Predictive Risk Assessment for Preterm Infants: A Clinical Decision Support Approach** *Merin Mathew, Ashim Chakraborty, Arunava Dhar, Silvia Cirstea*

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Special Session 07 - Advanced Power Electronics and Control Strategies for Energy Conversion and Storage Systems in Future Power System

Chairs: Bruno Allard, Morcos Metry

- **Interlink Power Converter based on Series-Parallel Cells for Hybrid Microgrid Systems** *Ricardo Lizana, Esteban Concha, Abraham M. Alcaide, Sebastian Rivera*
- **Evaluation of a Matrix Modular Multilevel Converter based on a Series-Parallel Converter** *Pablo Burgos, Ricardo Lizana, Abraham M. Alcaide, Sebastian Rivera*
- **Improving Active Power Regulation for Wind Turbines: A Data-Driven MPC Approach** *Mostafa Soliman, Mohammad Tayyab, Morcos Metry, Walid Alqaisi*
- **Multi-Variable Optimization Framework for Converters: Enhancing Single-Point and CEC-Weighted Efficiency** *Mohsin Asad, Ali Khajehoddin*
- **Deep Learning Based Cybersecurity Enhancement Strategy in Microgrids** *Hamid Jafarabadi Ashtiani, Soroush Naeiji, Amirhussein Zia, Zheng Shen*

Room 338

Technical Track 04 - Electrical Machines and Drives I

Chairs: Larisa Dunai, Nasir Ali

- **Induction motor bearing fault diagnosis using Taylor-Fourier filters on stray flux signals** *Gloria Sarahi Aguayo-Tapia, Gerardo Avalos Almazan, Jose Rangel-Magdaleno, Jose Antonino Daviu, Jose E. Ruiz-Sarrio, Dunai Larisa*
- **Fuzzy Logic Control of a 6-Phase Axial Flux Permanent Magnet Synchronous Generator in Faulty Modes** *franck BETIN, YAZIDI AMINE, Omar Bouyahia, Marius OUEDRAOGO*
- **Comparison of Bearing Fault Classification using STFT, CWT and 2D-DOST with a Lightweight CNN model** *Geovanni Díaz Saldaña, Luis Morales Velazquez, Jose Antonino Daviu, Vicente Biot-Monterde*
- **Hybrid Control of Permanent Magnet Synchronous Motor Using Unknown Input and Extended State Observers with Improved Inter-Axis Decoupling** *Armita Fatemimoghadam, Lakshmi Varaha Iyer, Narayan Kar*
- **Multi-Objective Design Optimization of Multi-Layer Hybrid Magnet PMSM Considering Irreversible Demagnetization Conditions** *Farnam Farshbafroomi, Aran Shoaei, Qingsong Wang*
- **Adaptive Neuro-Fuzzy Control for Electric Machine Emulation of PMSM under Fault** *Hadi Mohajerani, Uday Deshpande, Narayan Kar*

Room 213 B

Tutorial 5 - Power quality issues due to industrial electronics equipment, its effects and an optimal solution - Dr. George Sebastian and Dr. Sincy George

In recent years, there has been an increased use of power electronic systems and sensitive electronic equipment in power generation, transmission, utilisation of electrical energy and associated systems. Nonlinear impedances predominantly offered by the power converter-based systems draw non-sinusoidal or distorted currents from the power source causing distorted voltage across the transmission line and transformer impedances. This results distortion in power supply waveform and cause distortion voltampere

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and low power factor in system. Further, asymmetrical distribution of large, single-phase loads results in voltage and current imbalance in the three-phase system. Distorted, unbalanced voltage and/or current waveforms have several adverse effects on both utilities and consumer equipment connected the power supply system. Traditional equipment like heaters and incandescent lamps are least affected by imperfection in sinusoidal waveform of power supply. However modern sensitive electronic items, where its operation depend on supply waveform are more affected by power quality. Thus, in area where extreme accuracy and precision is required, ie., in application involving measurement, instrumentation, communication, signal processing, fault detection, control, automation, robotics etc., are more affected by waveform distortion or power quality. It also increases component heating, higher losses and cause accelerated ageing, necessitating increased frequency of maintenance or even interruption and failure of the system. Thus, incurring huge economic loss.

Having realised the importance of power quality, IEEE and IEC have formulated standards on the topic, more importantly on harmonics. Some countries have imposed economic penalties for violation of its regulations on power quality. Hence, an effective elimination of the harmonics from the supply system is essential for both the utilities and end users. Loads and renewable energy power generation in the system vary randomly and consequently the conventional solution under multiple harmonic frequency using tuned passive filters are ineffective.

Active compensation using voltage source converter is the solution to compensate for voltage or current harmonics, reactive power and imbalance in voltage or current in the system. Generally, current compensation is done using shunt active compensator and voltage compensation by series active compensator and both voltage and current can be controlled at the same time using shunt- series active compensator. Main parts of these compensators are voltage source DC to AC converter which injects required amount of voltage or and current into the system to achieve desired outcome.

Under sinusoidal conditions, shunt compensators control reactive power to improve power factor and series compensators to control reactive power consumed by the transmission line to control active power flow through the line. When voltage is sinusoidal and current is non-sinusoidal, shunt compensator eliminates distortion power in addition to reactive power to achieve unity power factor and distortion free current. However, under non-sinusoidal supply voltage and current conditions, any attempt to achieve unity power factor using shunt compensator, results in a non-sinusoidal current, which increases the total harmonic distortion. On the other hand, attempt at getting harmonic free current may not yield unity power factor because of the harmonics present in the voltage waveform. This tutorial presents an algorithm which optimizes trade-off between power factor and harmonics achieving the best compromise under non-sinusoidal voltage and current conditions. With the technique, an optimal operation of shunt, series and shunt-series compensator is possible. An algorithm developed and validated under various supply and load conditions meeting requirements of IEEE 519 is also covered in the tutorial.

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Chairs: Marcian Cirstea

Room 347

Technical Track 07 - Motion Control, Robotics and Mechatronics

Chairs: Rached Dhaouadi

- **Reachability-Based Path Planning Using RRT for Construction Processes with Ensured Handover Capabilities** *Charlotte Stein, Andreas Gienger, Oliver Sawodny, Cristina Tarín*
- **Adaptive Robust Tracking Control for Precision Motion Stages via Fully Actuated System Approach** *Jinglong Wang, Zhan Li, Weichao Sun, Kamal Al-Haddad, Huijun Gao*
- **Trajectory Design Using a Behavior Model, Enabling User-Friendly Adjustment or Selection** *George Smith*
- **Adaptive Neural Fractional-Order Pseudo-Inverse Control for a Giant Magnetostrictive Actuator** *Pukun Lu, Jinjun Shan*
- **Adaptive Feedback Linearization for Altitude and Attitude Control of a Quadrotor Under Parameter Uncertainty** *Ishaq Hafez, Rached Dhaouadi*
- **Research on Estimation Method for Dynamic Characteristics of Micro Objects Using Micro-Macro Bilateral Control** *Shohei Arikawa, Naoki Motoi*

Room 213 A

Tutorial 4 - Optimizing On-Board Charging Infrastructure: PFC Converter Solutions for Electric Mobility- Dr. Arun Kumar Verma

This tutorial explores power factor correction (PFC) converter designs tailored for on-board charging applications in electric vehicles (EVs). The transition to EVs is accelerating worldwide due to environmental concerns and technological advancements. However, efficient charging infrastructure remains a critical challenge. Traditional two-stage chargers suffer from complexity, cost, and efficiency issues. In contrast, innovative PFC converter designs offer solutions to enhance charging efficiency, reliability, and scalability. This tutorial presents novel converter architectures and methodologies, focusing on efficiency, cost-effectiveness, compliance with standards, and technological innovation. Participants gain a comprehensive understanding of PFC converter principles, design techniques, industry best practices, and emerging trends, fostering collaboration and knowledge sharing within the industrial community.

Chairs: Glaucia Melo

12:00-13:00

Poster Session

Poster Session 1

Chairs: Dr. VSR Varaprasad Oruganti

- **Computer Vision-based Approach for Energy Efficiency in Commercial Buildings** *Mohamed Abido, Mohamed Sobih, Aboubakr Salem*
- **Current Dip Analysis and Efficiency Optimization in DCZVS Flyback Converters via State Trajectory Approximation** *Song Ding, Xiaowei Zhu, Chunyan Nie, Qi Liu, Qing Luo, Qinsong Qian*
- **Iron Loss Determination Methods in Induction Motors: A Review and the IEEE 112 Standard Method Verification** *Moslem Geravandi, Hassan Moradi, Mohammad Sedigh Toulabi*

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	Electromagnetic Design of an Enhanced-Torque Profile Four-Phase Switched Reluctance Motor for Variable-Speed Applications *Hassan Moradi, Moslem Geravandi, Mohammad Sedigh Toulabi* **Indirect Electrification Through Hydrogen: Evaluating Distributed Generation for Fuel Cell Vehicle Autonomy** *Valeria Juarez-Casildo, Marco A. Herández-Nochebuena, Ilse Cervantes* **Optimal Design of Remote Green Hydrogen-Based Power-to-Power Microgrids Using Starfish and Artificial Hummingbird Algorithms** *Ahmed S. Menesy, Kotb M. Kotb, Hamdy Sultan, Mohamed Zaery, Ibrahim Habiballah, Mahmoud Kassas, Mohamed Abido, Salah Kamel* **An Analysis of the Reward Function of a Hexapod Robot** *Tharindu Karunarathna, W. Mohamed Saki, Sankavi Kanesalingam, W.A.B.G Hanshini B.P Weerasinghe, A.M. Harsha S. Abeykoon, Kasun Prasanga, R.M.Maheshi Ruwanthika* **Low-Effort H'Control for Z-Source Inverter Under Unbalanced Loads** *Adam Adib, Amir Abolfazl Suratgar, Ehsan Ranjbar, Kamal Al-Haddad* **Hierarchical Lyapunov-Based Model Predictive Control for Islanded AC microgrid** *Abdelbasset Krama, moussaabderrahim mehiris, Billel Talbi, Idris Messaoudene, Houssam Eddine Mansouri, Abdeslem Sahli, Morcos Metry* **Impact of Mixed Magnets and Their Placement on Traction IPMSM Performance** *Bipana K.C., Andrew Botham, Reza Nasirizarandi, Hossain Mohammadi, Narayan Kar* **A Robust Sensorless Full Parameters Identification Algorithm for Permanent Magnet Synchronous Machines** *Mojtaba Ayaz, Hamidreza Mosaddegh, Simon Caron, Kamal Al-Haddad* **A Novel Accurate Filterless Initial Rotor Position Estimation Algorithm For Salient Pole Permanent Magnet Synchronous Machines** *Hamidreza Mosaddegh, Mojtaba Ayaz, Simon Caron, Kamal Al-Haddad* **Characteristic Changes of Shaft Voltage According to the Manufacturing Process of WFSM** *Jun-Hyeok Heo, Yun-Su Yang, Jin Hur*
12:30-13:30	*Lunch Area* **Lunch**
13:30-14:15	*Room 214* **Industry Panel Session 2 – How to Trust Technology Further Than We Can Throw It (David Bruemmer)** David Bruemmer, W8less LLC, Founder, USA. (Moderator) Alex Huk, Ph.D., Director, Fuster Laboratory for Cognitive Neuroscience, USA. Dr. Scott Thayer, CMU professor, QinetiQ North America, USA. Eric Krotkov, President, EK Consulting AI, Advisor – Toyota Research Institute, USA. Mel Torrie, CEO/Founder Autonomous Solutions (ASI) Inc, USA. Treggon Owens, CEO of AerialMob, USA. Dr. Julie Marble, Professor, University of Maryland, USA. Agata Ciesielski, Founder, Tethics LLC, USA. Dr. Milos Manic, Professor, Virginia Commonwealth University, USA. Outline Has technology development in the recent past increased or decreased trust? Autonomy has been a long term promise from the engineering community but the autonomy we see in robotics and AI is not always trustworthy and reliable. Consider self-driving cars and the challenges assocoiated with fully

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	autnomous drones and robots. AI is moving quickly forward but not necessarily with a humanity centered focus. The outcome of new tech funding is not entirely positive, especially when it comes to the perception of the average person. An increasing number of people see technology as a source of danger and harm. They fear that technology is coming for their job, threatening their individual freedom and privacy. Is the anti-tech sentiment limited to AI and software or is it bleeding into other tech sectors such as industrial electronics? How do we engender wholesome and appropriate trust with a human-centered design focus and efforts to increase reliability and robustness? To dive into these important issues the panel will move through the following topic areas with questions from the audience inserted into each topic area. Chairs: Varaprasad Oruganti
14:15-15:00	*Room 214* **Keynote 3: Ultra-fast charging and ubiquitous infrastructure - Dr. Don Tan** Abstract As the EV technology for the driving train entered the phase of maturity with many superior performances, significant progress in battery technologies ushed in the era of electrical vehicle proliferation. Battery-powered electric vehicles (BEV) are now in price parity with internal combustion engine (ICE) cars, even being more competitive. Many countries/regions now have aggressive mandates towards zero-emission to combat global climate change. A major remaining obstacle is the availability of ultra-fast charging required for long-haul driving and ubiquitous charging structure for everyday driving. We will discuss the challenges facing ultra-fast charging and available solutions coming on the horizon. We will provide a new thinking in achieving ubiquitous charging infrastructure by leveraging existing and readily-available technologies. For autonomous vehicles, wireless power charging provides a path forward. The newly-founded IEEE Transportation Electrification Council (TEC) is providing much-needed leadership in the technical space to help pushing for ubiquitous charging infrastructure on a global scale. Bio Dr. Tan earned his PhD from Caltech. He is a member of the National Academy of Engineering and a fellow of the IEEE. He has served as Distinguished Engineer, Fellow, Chief Engineer-Power Conversion, Program Manager, Department Manager, and Center Director in a US Fortune 500 corporation. Unusually prolific as a visionary technical leader in ultra-efficient power conversion and electronic energy systems, Dr. Tan has pioneered breakthrough innovations with numerous high-impact industry firsts and record performances that received commendations from the highest level of US Government. He has developed hundreds of designs and thousands of hardware units deployed for space applications without a single on-orbit failure. His suite of world-class electronics performed flawlessly on the James Webb Space Telescope (JWST), located one million miles away, achieving world-record-breaking performances. Dr. Tan is the IEEE Technical Activities Vice President-Elect 2025, founding President of IEEE Transportation Electrification Council, Chair of IEEE Fellow Advisory and Oversight Subcommittee, and Vice Chair of IEEE Industry

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	Engagement Committee. Among numerous others, Don has served as Division II Director, IEEE Board of Directors; Fellow Committee Chair, IEEE PELS/PES eGrid Steering Committee Chair, PELS Long Range Planning Committee Chair, Nomination Committee Chair, PELS President, Editor-in-Chief (Founding) for IEEE Journal of Emerging and Selected Topics in Power Electronics, APEC (the fourth largest event in IEEE) General Chair, PELS Vice President-Operations, Guest Editor-in-Chief for IEEE Transactions on Power Electronics and IEEE Transactions on Industry Applications, Fellow Committee, PELS Vice President-Meetings, IEEE Chair for IEEE/Google Little Box Challenge (awarded $1M cash prize), and IEEE/DoD Working Group Chair, developed IEEE/ANSI standards 1515/1573. Don has delivered about 130 keynotes/invited global presentations. He has received more than $30M+ external customer funding for research and technology development. He also serves on many prestigious national and international award, review and selection committees.
15:00-15:15	*Lunch Area* **Coffee Break**
15:15-17:15	*Room 302* **Technical Track 03 - Power Systems, Renewable Energy Systems and Smart Grid II** Chairs: Massimiliano Luna, Djaffar Ould Abdeslam **A Residential Hybrid Nanogrid Based on Solid State Transformer Technology** *Nasrin Einabadi, Mehrdad Kazerani* **Optimized Power Control in Grid-Connected Electric Vehicles Using Feed-Forward Neural Networks** *Seyedmohammad Hasheminasab, Mohamad Alzayed, Hicham Chaoui, Mohammad Zamani Khaneghah, Armin Lotfy* **Enhanced Power Sharing in Microgrids Using Adaptive Neuro-Fuzzy Control** *Seyedmohammad Hasheminasab, Mohamad Alzayed, Hicham Chaoui, Armin Lotfy, Mohammad Zamani Khaneghah* **Managing Uncertainty by Leveraging Flexibility in Smart Energy Systems: AI-Supported Distributionally Robust Chance-Constrained Optimization** *Marwan Mostafa, Finn Nußbaum, Payam Teimourzadeh Baboli, Christian Becker* **A Multi-Purpose Method for Sizing and Placement of Electric Vehicle Charging Stations in Urban Areas** *Whomaira Faarhin Durdana, Tohid Rahimi, Julian L Cardenas Barrera* **Deep Reinforcement Learning-Based Energy-Efficient Sensor Scheduling for Remote State Estimation in Islanded Microgrids** *Zhitao Fan, Xingquan FU, Guanghui Wen*
	Room 215 B **Technical Track 01 - New Technologies for Electric Transportation I** Chairs: Bruno Allard, Qingsong Wang **Reliable Real-Time Charging Profile Estimation for Fast EV Chargers under Faulty Conditions** *Ali Sharida, Naheel Kamal, Sertac Bayhan, Haitham Abu-Rub* **Design Optimization of Hybrid Magnet CMGs with Non-Uniform Air-Gap Considering Demagnetization Analysis** *Aran Shoaei, Farnam Farshbafroomi, Qingsong Wang, Kamal Al-Haddad*

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Enhancing Communication and Energy Efficiency in an IoT-Enabled Solar-Powered Vehicle *William olsson, Ruben Croall, Edison Pignaton De Freitas, Alexandre dos Santos Roque, Daniel Pohren*

Aerodynamic Modelling of a Small Electric Aircraft *Lekha Dasari Murugappa, Mehrdad Kazerani*

Precise Vehicle Mass and Parameter Estimation for Energy Consumption Prediction with a robust Extended Kalman Filter *Sören Hain, Oliver Sawodny*

Minimizing Total Travel Time for Intelligent EVs with Real-Time Traffic and Charging Constraints *Md Shahed Hossen, Ibrahim Sorkhoh, Thiago E. Alves de Oliveira, Dariush Ebrahimi*

Model Predictive Control of 65kW SRM Traction Motor With Offline Torque Optimization *Behzad Abdi, Tara Rajabi Nezhad Siahpoosh, Babak Nahid*

A Hybrid Optimization Algorithm for the Design of DC Resistant Medium-Frequency Transformers *Fabian Herzig, Iurii Marych, Osamah Al-Dhaifi, Rik W. De Doncker*

Room 344

Technical Track 10 - Industrial Informatics: Cloud Computing, Big Data, AI, Informatics and Software Engineering I

Chairs: Nasrin Tavakoli, Francesco Biondani

Optimal and Heuristic Solutions for Efficient Vehicle Patrol Scheduling in Dynamic Urban Safety *Majid Ghasemi, Ibrahim Sorkhoh, Fadi Alzhouri, Dariush Ebrahimi*

Streamlining AAS Data Exchange: A Novel Approach Using Protocol Buffers *Tom Gneuss, Uwe Schmidt, Nico Braunisch, Marko Ristin, Hans Wernher van de Venn, Martin Wollschlaeger*

Predictive Maintenance in Semiconductor Manufacturing: AI Machine Learning Application for Downtime Reduction *RAM CHANDRA PALSANIYA*

Kotz Mixture Model with Semi-Supervised Projected Model-Based Clustering *TSEGA WELDU ARAYA, Nizar Bouguila, Jamal Bentahar, Muhammad Azam*

Software-Defined Vehicles: Bridging Industry and Research Perspectives *Bálint Máté, Max Scheerer, Ralf Sieger, Oliver Denninger, Joerg Henss*

Leveraging Software Development of I4.0 Digital Twins for PLC Programming *Nico Braunisch, Uwe Schmidt, Tom Gneuss, Marko Ristin, Marcin Sadurski, Hans Wernher van de Venn, Martin Wollschlaeger*

GAIA: A Comprehensive Pipeline for Enabling Aircraft Digital Twin Creation *Francesco Biondani, Luigi Capogrosso, Uzair Khan, Nicola Dall'Ora, Enrico Fraccaroli, Domenico Migliore, Francesco Acerra, Marco Cristani, Franco Fummi*

Zero-Sample Fault Diagnosis for Bearings Using An Hierachical Constrast Learning Approach *yifan wu, Dandan Zhao, Min Xia*

Room 109

Technical Track 05 - Power Electronics & Energy Conversion I

Chairs: Thierry Meynard, Li Chushan

Design Optimization of Pulse Transformers in Series-Type Hybrid Circuit Breakers Using a Neural Network based Surrogate

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Model *Amirhussein Zia, Soroush Naeiji, Hamid Jafarabadi Ashtiani, Zheng Shen*

Advanced Condition Monitoring of Metal Oxide Varistors (MOVs) in DC Circuit Breakers Using Unsupervised Machine Learning Methods *Soroush Naeiji, Amirhussein Zia, Hamid Jafarabadi Ashtiani, Zheng Shen*

TransformerLess Partial Voltage Converters for PV-BESS Plants *Thierry MEYNARD, Zoran MILETIC, Andres TARRASO, Petar Grbovic*

TransformerLess Partial Voltage Architectures for high power PV plants *Thierry MEYNARD, Jeremy MARTIN, Pier Paolo BEMBICH*

TransformerLess Partial Voltage Architectures for tripling the power of xCell electrochemical systems *Thierry MEYNARD, Jeremy REGNIER, Luc DUMAS-LAUSSINOTTE, Didier FLUMIAN*

Design and Analysis of a Triple Active Bridge Converter for Simultaneous Charging of Two Different EV Batteries *Afraz Ahmad, Ilamparithi Thirumarai Chelvan, Waqas Hassan*

Adaptive Control Design for Dual EV Charging Using Triple Active Bridge (TAB) Converter *Afraz Ahmad, Ilamparithi Thirumarai Chelvan, Waqas Hassan*

Modular Multilevel Serial-Parallel Converter (MMSPC) for the Tokamak SMART *Pablo Vicente-Torres, Abraham M. Alcaide, Jose I. Leon, Ricardo Lizana, D. J Cruz-Zabala, Manolo Garcia-Munoz*

Room 338

Technical Track 04 - Electrical Machines and Drives II

Chairs: Joao Martins

Common mode rejection in Single DC-Link fed PHIL Emulator *Neetusha Kalarikkal, Pragasen Pillay*

Improved Bearing Fault Modeling and Current Signature Analysis for Permanent Magnet Synchronous Motors *Nimesh Jayasena, Battur Batkhishig, Babak Nahid-Mobarakeh, Ali Emadi*

Static and Dynamic Eccentricity Fault Detection and Quantification in an Inverter-fed Reluctance Synchronous Machine Using Machine Learning *Latifa Yusuf, Thirumarai Ilamparithi, Belaid Moa*

Inverter Open Switch Fault Detection Using BiLSTM Neural Network in Induction Motor Drive *Mohammad Zamani Khaneghah, Mohamad Alzayed, Hicham Chaoui, Seyedmohammad Hasheminasab, Armin Lotfy*

Reinforcement Learning for PMSM: Effects of Choosing a Reward Function *Juan Escarate, Esin Ilhan Caarls, Jan Schellekens, George Papafotiou*

Comparison of Series-Hybrid Variable-Flux Synchronous Motors Considering Two Types of Rare-Earth Magnets *Hani Eltouni, Pragasen Pillay*

Performance Investigation of Induction Motor Mechanical Torque Limiting Method *Amir Kermanizadeh, Pierre Angers, Pragasen Pillay*

Rare-Earth and AlNiCo Magnets Interaction in Hybrid Magnet Variable Flux Machines *Bassam S. Abdel-Mageed, Pragasen Pillay*

Room 213 B

Technical Track 06 - Control Systems I

Chairs: Michael Basin, Rached Dhaouadi

Nonlinear Robust Control Using an Inside-Out Strategy with User-Friendly Tuning *George Smith*

Load-related and eccentricity fault diagnosis in induction motors

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using decision tree and genetic algorithms *Jonathan Cureno Osornio, Israel Zamudio, Vicente Biot-Monterde, Dunai Larisa, Jose Antonino Daviu*

Longitudinal Vehicle Dynamics Parameter Identification for Effective Control System Design *Max Mauro Dias Santos, Mathias Luz, Jefeson Lima, João Francisco Justo*

Hierarchic Multi-Agent Energy Management for Extended Driving Range through Battery Cell Balancing *Armin Lotfy, Mohsen Kandidayeni, Hicham Chaoui, Loïc Boulon, Mohammad Zamani Khaneghah, Seyedmohammad Hasheminasab*

Design of Adaptive Emergency Braking System on Collision Distance with Different Brake Levels *Max Mauro Dias Santos, Tiago Horiy, Lucas Portello, João Francisco Justo*

Radiation-Tolerant Universal Control Electronics for Energy Extraction Systems at CERN *Martin Grigorov, Alessandro Donato, Bozhidar Ivanov Panev, Mathieu Favre, Mirko Pojer, Spyridon Georgakakis, Vasja Pirc*

An Oscillator Framework to Encompass Different Control Strategies for Grid-Forming Converters *Marcio Stefanello*

Room 347

Technical Track 09 - Signal and Image Processing and Computational Intelligence I

Chairs: Mihoko Niitsuma, Julio C. Rodríguez-Quiñonez

A Novel Hybrid ML Approach for Powerline - Vegetation Encroachment Area Identification *Damos AYOBO ABONGO, Wael Jaafar, Rami Langar*

AI-Based Real-Time Risk Detection and Safety Assessment in Electricity Maintenance Using 2D and 3D Image Analysis *FRANCISCO FAMBRINI, Diogo Gará Caetano, Roberto Bertolla, Eduardo Carrara, Lise R. R. Navarrete, Amanda Lopes Fernandes*

Real-Time AI-Driven Risk Detection and Safety Assessment in Electrical Maintenance through 2D/3D/360 degrees Vision Systems *FRANCISCO FAMBRINI, Diogo Gará Caetano, Eduardo Luis Carrara, Roberto Bertolla, Lise R. R. Navarrete, Amanda Lopes Fernandes*

Hybrid Deep Learning and Geometric Analysis for Railway Sinkhole Detection in LiDAR Point Clouds *Maryem BOUALI, Fakhreddine ABABSA, Muhammad Ali SAMMUNEH, Rani EL MEOUCHE, Bahar SALAVATI, Flavien VIGUIER*

ArrowPose: Segmentation, Detection, and 5 DoF Pose Estimation Network for Colorless Point Clouds *Frederik Hagelskjaer*

Crop Classification Using LSTM Neural Networks *Athavan Balakumar, Sina Adham Khiabani, Abhijit Sinha*

Nonparametric Variational Infinite Libby-Novick Beta Mixture Model for Medical Data Clustering *Diaa Azzam, Muhammad Azam, Nizar Bouguila*

Diffusion-Based Super-Resolution of Sentinel-2 Imagery for Improved Forest Species Classification *Nikita Belyakov, Svetlana Illarionova, Usman Tasuev, Julio Rodriguez, Wendy Flores-Fuentes, Oleg Sergiyenko, Evgeny Burnaev*

Room 213 A

Special Session 13 - Advances in Fault Diagnosis and Tolerance Strategies for Intelligent Transportation Systems

Chairs: Hoa Tran-Dang, Max Santos

Tree-Based Machine Learning for Fault Diagnosis in Autonomous Underwater Vehicles *junhong zhou, Yu Wang, Choon Liang Lee*

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	Multi-fault tolerant control for PMSMs considering interturn short circuits *Martin Ackermann, José-Luis Marqués, Claus Hillermeier* **Cyberphysical Fault Propagation and Detection in Connected Electric Vehicles** *Jeffrey Qiu, Ahmad Aljanaideh, Mohammad Al Janaideh, Deepa Kundur* **Cyber-physical Fault Detection in Autonomous Electric Vehicle Platoons with Lateral Motion** *Jiacheng (Jason) Chen, Luke Yang, Jeffrey Qiu, Mohammad Al Janaideh, Deepa Kundur* **Model-Based Fault Injection and Diagnostic Validation for AUTOSAR Software Components in Safety-Critical Automotive Systems** *Max Mauro Dias Santos, Calequela Manuel, Jean Franco, Vinicius Silva, Layhon Santos, Glaucia Melo* **Comparative Study of Classical and Deep Learning Methods for Bearing Fault Diagnosis of Electrical Machines** *maryam vazifehdan, Salman Abdi Jalebi, Sérgio Cruz, sara sharifzadeh* **An Overview of Cyber-Physical Security in Electric Vehicle Charging Technologies** *Samaneh Yazdanipour, V.S.R. Varaprasad Oruganti, Jeonggi Son, Reza Arani, Sheldon Williamson*
15:15-17:45	*Room 214* **SYPA Forum** Chairs: Chathurika S Wickramasinghe
Sunday, 22 June 2025	
08:00-18:00	*Registration* **Registration**
	Speaker Room **Speaker Room**
08:30-09:00	*Main Auditorium* **Keynote 4: Wireless Charging for EVs Is the Future - Dr. Sahar Sam, Wireless PNC** Abstract: As the world races toward electrified transportation, one critical barrier remains: the limitations of traditional EV charging infrastructure. In this keynote, we explore how wireless charging is poised to redefine the EV landscape eliminating plug-in hassles, reducing maintenance, and enabling a seamless user experience. With over 60% of urban trips under five miles and micromobility surging, the need for convenient, universal, and scalable charging solutions has never been greater. Wireless charging offers a future-proof path forward safer, faster, and more adaptable to a range of vehicles, from e-scooters to full-sized EVs. The talk will discuss the role of AI integration, smart infrastructure, and interoperable technology standards in shaping this future, as well as how wireless solutions support fleet operators, OEMs, and smart city initiatives. Further the talk will discuss cases for wireless EV charging that show this technology is not just as a convenience but as a critical enabler of global decarbonization, urban mobility, and sustainable infrastructure. Join us to discover how wireless power can drive the next leap in clean transportation. Bio

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	Dr. Sahar Sam hold a B.Sc. and an M.Sc. in Materials Science and Engineering from Shiraz University and a Ph.D. in Mechanical Engineering from the University of Victoria. She has over 15 years of managerial experience in the industrial and academic environment. She also have more than 5 years of experience as an intrapreneur and entrepreneur focusing on fabricating and commercializing new technologies related to information and communication devices. She is the named inventor in 3 patents. Currently, she is the Co-Founder and Chief Scientific Officer at Solaires Entreprises Inc. on the mission to create the next generation of solar cells. She is the Director & Founder of Wireless PNC, develops and commissions wireless charging stations for e-mobility application across.
09:00-09:30	*Main Auditorium* **Keynote 5: Critical Minerals and Their Implications on New EV Products - Dr. Sooki Winkler, National Research Council Canada** Abstract: Critical minerals are essential for many growing energy technologies – from wind turbines, electrical networks and electric vehicles (EVs). More specifically, elements such as lithium, cobalt, nickel, manganese and graphite are necessary for the manufacture of EV batteries, while REEs are crucial for the manufacture of permanent magnets used in EV motors. Geopolitical tensions, shortages and price volatility in these materials could hinder the production of these critical EV components and negatively impact the mass adoption of EVs. Hence, to mitigate these risks, diversification into alternative materials and processes is needed to develop new EVs technologies with reduced or no critical minerals. Bio: Dr. Sooky Winkler is the Program Director of the e-Auto Challenge Program at the National Research Council of Canada. She is a licensed Professional Engineer in Ontario and holds a Ph.D. in Materials Science and Engineering from Imperial College London, UK. Dr. Winkler has over 25 years of strategic leadership experience in the development and commercialization of advanced technologies, with a strong background in partnership and stakeholder management in the automotive sector. Her 14-year career at Dana Inc., a global Tier 1 Automotive company included Global Head of Advanced Materials & Process Engineering, where she shaped strategies for next-generation EV products and led sustainability initiatives with academia, government and industry. Before joining the NRC, Dr. Winkler worked at Innovations, Science and Development Canada (ISED) as a Senior Innovation Advisor helping Canadian SMEs grow their business domestically and internationally with her expertise. She is passionate about sustainable business innovation and HQP development; and has served on the Board of Directors of technology accelerator REMAP and as Adjunct Professor at the Universities of New Brunswick and Waterloo.
09:30-10:15	*Main Auditorium* **Industry Panel Session 3: The Next Frontier of Artificial Intelligence: Generalist Robotics and Physical AI - Dr. Milos Manic** Dr.Milos Manic, Professor, Virginia Commonwealth University, USA.

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	(Moderator) Dr. Gustavo Pessin, Full Researcher, Instituto Tecnológico Vale (ITV). Head of the Robotics, Instrumentation and Control Lab, Brazil. Dr. Carlos Eduardo Pereira, Full Professor - Automation Engineering UFRGS – Brazil. Dr. Leandro Buss Becker, Professor universitário na Universidade Federal de Santa Catarina, Brazil. Lucas Assis, Founder and CEO @ Synkar Autonomous, Brazil. Dr. Daswin de Silva, Professor of AI and Analytics, La Trobe University, Australia Stamatis Karnouskos, SAP, Germany. Giuliano Neves Da Silva Mendonce, Embraer, Brazil Outline: Industrial robots in factory, warehouse, and navigation automation are typically pre-programmed for repetitive motion in pre-defined settings. While this manual and model-based engineering approaches are adequate for deterministic and simple behaviours, the complexity of real-world environments remains out of reach for robots. Recent advances in Generative AI are making headway into addressing this gap through robotic foundation models, synthetic and simulated robotic actions training datasets and cross-embodiment skills transfer. Tesla Optimus, Covariant RFM-1 NVIDIA Isaac GR00T, and Pollen Robotics Reachy are pushing the boundaries of AI robotics innovations. Chairs: Varaprasad Oruganti
10:00-18:00	*Exhibiton Hall* **Exhibition**
10:15-10:30	*Lunch Area* **Coffee Break 1**
10:30-12:00	*Room 302* **Technical Track 03 - Power Systems, Renewable Energy Systems and Smart Grid III** Chairs: Massimiliano Luna, Djaffar Ould Abdeslam **Regenerative Grid-Forming Inverter with Energy Storage for Next-Generation Power Systems** *Michael Lteif, Uzair Asif, Mohammad Shadmand* **An Energy Management System Capable of Microgrid Flexibility Evaluation to Support Demand Bidding** *Marco Misia, Giuseppe La Tona, Antonino Sferlazza, Francesco Sergi, Giovanni Brunaccini, Davide Aloisio, Massimiliano Luna* **Power Efficiency Optimization in a Nanogrid Using a Nash Bargaining-Based Power Management Strategy** *Shadi Zargari, Javad Ebrahimi, Suzan Eren* **Techno-Economic Assessment of a Solar Drying Plant Using Concentrated Solar Power Technology and Eutectic PCM Mixtures for Thermal Storage** *Ashutosh Verma, Claude El-Bayeh, Walid Alqaisi, Khaled Alzareer, Mohamed Zellagui, Morcos Metry, Wesam Rohouma*
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Special Session 17 - Robust Battery Management Systems for Safe, Efficient, and Reliable Electrification

Chairs: Balakumar Balasingam

- **An Offsetting-Based Correction to Improve the Accuracy of Low-Rate OCV Curves for Lithium-Ion Batteries** *Nick Nguyen, Balakumar Balasingam, Prarthana Pillai, Sooraj Sunil*
- **Fast Electrochemical Impedance Spectroscopy for Battery Testing** *Sneha Sundaresan, Krishna Pattipati, Balakumar Balasingam*
- **Real-time State of Power Estimation of a Lithium-Ion Battery Using Novel Battery Observation Model and the Recursive LS Filter** *Prarthana Pillai, Krishna Pattipati, Balakumar Balasingam*
- **A Multi-Objective Reinforcement Learning Based Energy Management Strategy for Electric Vehicles with Battery and Supercapacitor Integration** *Parisa Ranjbaran, Javad Ebrahimi, Alireza Bakhshai, Praveen Jain*
- **A Cost-Effective and Energy-Efficient Mechanical Contactor for 48V Electric Vehicles with Reconfigurable Battery Systems** *Maziyar Fakhraei, Peng Cheng, Kent Bertilsson*

Room 213

Tutorial 6: Advances in Battery State Estimation using Machine Learning and Deep Learning toward AI-driven Battery Management Systems - Dominic Karnehm,

Presenters:
Dominic Karnehm, University of the Bundeswehr Munich
Sebastian Pohlmann, University of the Bundeswehr Munich, Neubiberg

Li-Ion batteries are widely used in electric vehicles (EVs) and stationary energy storage applications due to their safety, lifetime, and inherent advantage in energy efficiency. Li-Ion batteries have shown great promise in various applications, and understanding their performance is crucial for future advancements.

Accurate modelling of cells' behaviour is required to estimate the inner state. To increase the optimal use and lifespan of batteries, the determination of the states, such as State of Charge (SOC), State of Health (SOH), remaining useful life (RUL), thermal behaviour, and impedance, are crucial. As a result, industry and academia use various methods to estimate all kinds of battery states. Depending on the required accuracy and the accessible computational resources, different approaches to reproduce battery behaviour can be used. The proposed battery models in the literature can be classified into three categories: electrochemical models, equivalent circuit models, and data-driven models.

Electrochemical and equivalent circuit models characterize battery behavior through chemical parameters and electrical elements to simulate the underlying electrochemical processes and to replicate the battery performance characteristics.

Data-driven models employ several machine learning algorithms, including support vector machines, Gaussian process regression, and deep learning algorithms, such as Long short-term memory (LSTM), Kolmogorov-Arnold

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Network (KAN), and Physics Informed Neural Networks (PINN). Machine learning algorithms do not depend on knowledge about battery parameters but on large quantities of high-quality data, including different operational conditions, such as load, drive cycle, battery age, and temperature.

Data-driven techniques have shown promising results in accurate battery state estimations. The tutorial will present a detailed overview of machine learning and deep learning algorithms to estimate several battery states. With data augmentation and the addition of simulated data, we show and discuss a method to handle the lack of data necessary for training and validation and show the possibilities and advantages as well as the shortcomings of this method. High-accurate state estimation methods require a high amount of data and computational resources. Cloud-based BMS is an AI-enabling technology in battery storage systems. This tutorial will discuss the possibilities and required technologies to deploy cloud-based BMS, such as public cloud computing and the Internet of Things (IoT).
Chairs: Emil Levi

Room 338

Special Session 14 - Emerging Innovations in Electric Transportation: Paving the Way for a Sustainable Future

Chairs: Jerry Kan, Max Santos

Comparative Study of Three-phase PMSM Controls with Two Current Sensors *Ying Zuo, JIA FU, Chunyan Lai, K. Lakshmi Iyer*

Analysis of Double-Layered Coil Structure for Underwater Wireless power transfer Systems *Joel Adubofuor, Kin Lung Jerry Kan, Sheldon Williamson*

An Overview of High-Efficient Single-Input Multi-Output (SIMO) Wireless Power Transfer (WPT) System *Ummemisbah Bhisti, K. L. Jerry Kan, Sheldon Williamson*

Adaptive Charging Algorithm for Resonant Inductive Wireless Power Transfer System Empowered by Mutual Inductance Identification and Voltage Ramping Method *Jeonggi Son, V.S.R. Varaprasad Oruganti, Sheldon Williamson*

Dynamic Analysis of Natural Frequencies in Air Blower Motors Considering Blade Count and Gyroscopic Effects *Alireza Siadatan, Afshin Rezaei-Zare, Amirhosein Mansouri, Hamed Karimi*

Room 347

Technical Track 07 - Motion Control, Robotics and Mechatronics II

Chairs: Daisuke Chugo, Rached Dhaouadi

Data-Driven MPC for Trajectory Tracking Control of Wheeled Mobile Robots *Sana Zahid, Chao Shen, Yang Shi*

Intuitive Human-Machine Steering Interface for 4WIS and Synchronous Steering Interaction Control considering Steering Intention *Ji Hoon Hwang, Seo Younghoon, Sehoon Oh, Nam Kanghyun*

Disturbance Compensation for Nonlinear Model Predictive Control Using Adaptive EKF With Disturbance Estimation *Takashi Ohhira, Hideki HASHIMOTO*

A Novel Inductive Position Sensor for Motion Control in Harsh

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	Environments *Kasun Prasanga, Kouhei Ohnishi* **A Parameter Identification method for Two-Mass systems with friction and limited motion range** *Razvan Andrei Budau Petrea, Roberto Oboe*
10:30-12:30	*Room 109* **IES Chapter Chairs Meeting**
12:00-13:00	*Poster Session* **Poster Session 2**
12:30-13:30	*Lunch Area* **Lunch**
13:30-14:15	*Room 214* **Industry Panel Session 4 - Strategies, Challenges, and Innovations in Transportation Electrification (Dr.Sanjida Moury)** Dr. Sanjida Moury, Engineer, Renewable Energy Program, Toronto Transit Commission (TTC), Canada. (Moderator) Andrew Cowles, Chief Engineer, Renewable Energy Program, TTC, Canada. Ray Micallef, Engineering Principal - Electrification Metrolinx, Canada. Sushma Narisetty, Director, Energy Transition/ Grid intelligence Toronto Hydro, Canada. Outline: This panel will explore the rapid electrification of Toronto's transportation landscape, focusing on the strategic, technical, regulatory, and environmental aspects of this complex transition. Bringing together senior leaders from public transit agencies and utilities, the session will provide a systems-level perspective on how Toronto is working toward a cleaner, electrified, and more resilient transportation ecosystem. The discussion will center on the electrification of public transit, featuring representatives from the Toronto Transit Commission (TTC) and Metrolinx. They will discuss their respective plans for achieving fully zero-emission fleets. Panelists will share insights into infrastructure planning, the challenges they face, and key enabling technologies that facilitate large-scale fleet conversion. The TTC and Metrolinx will serve as a case study in innovation, demonstrating how the integration of clean energy, battery storage, and electric bus infrastructure contributes to the decarbonization of transit operations. Additionally, the panel will address operational challenges, lessons learned, and performance data from pilot programs involving electric buses and trains, offering practical insights into real-world implementation. The panel will also examine the perspectives of infrastructure and utility providers, focusing on the effects of high EV adoption on Toronto's electrical grid, particularly in densely populated urban and transit areas. Panelists will explore strategies for smart charging, load management, and the development of rate structures designed to reduce peak demand and ensure grid reliability. Chairs: Varaprasad Oruganti
14:15-15:00	*Room 214*

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	Industry Forum Session 1: Wireless communication and cloud computing infrastructure for industrial automation systems - (Chair - Dr.Michael Condry , Forum - Dr.Zhibo Pang, Siddharth Dixit) Dr. Michael Condry, Condry Investment and Future Technology Consulting LLC., USA. (Chair) Dr. Zhibo Pang, ABB Corporate Research, Sweden. Dr. Mohamed Kashef, Research Scientist, NIST, USA. Sid Dixit, Principal Architect, CopperPoint Insurance Companies, USA. Outline: The industrial automation sector is undergoing a transformation driven by the rapid proliferation of communication and computing technologies, to meet the specific needs such as scalability, availability and performance in various application domains of Industrial Cyber-Physical Systems. To support the architectural shift, a novel paradigm called Cloud-Fog Automation was proposed to accelerate the convergence and synergy of various enabler technologies. One of the integral parts of realizing this novel paradigm is the integration of wireless communication and cloud computing technologies. Wireless communication is becoming increasingly prevalent in industrial automation as systems evolve toward more flexible, mobile, and interconnected architectures. The increasing adoption of wireless technologies provides significant benefits by reducing the cost and complexity of physical cabling, supporting mobility for reconfigurable production systems, and enabling real-time data exchange across distributed assets. Despite these advantages, significant challenges remain. Wireless communication networks must guarantee deterministic performance under stringent latency and reliability constraints. As another key enablers of modern industrial automation systems, cloud computing platforms host higher-level applications like production optimization and enterprise integration, while fog nodes handle time-sensitive control tasks closer to the physical process. The benefits of this approach are significant: it reduces capital and operational expenditures, simplifies system upgrades and maintenance, and supports rapid integration of AI/ML capabilities for predictive analytics and autonomous decision-making. While wireless communication and cloud computing each offer transformative benefits for industrial automation, their independent evolution creates critical integration gaps. This topic is thus motivated by the urgent need to develop co-designed, interoperable, and scalable architectures that harness wireless communication and cloud computing as foundational enablers of future-proof industrial automation systems. This panel aims to promote research, innovations, and applications to bridge the gap between theory and applications. Chairs: Dr. Michael Condry
15:00-15:15	*Lunch Area* **Coffee Break 2**
15:15-17:15	*Room 302* **Special Session 16 - Microgrid/Multi-Microgrid Innovations for Next-Generation Energy Networks**

Sunday, 22 June 2025

Chairs: Mostafa Mahdi Yousef, Li Chushan

3D-SVM Method for Controlling Zero-Sequence Component in Three-Phase Four-Wire Three-Level Inverters *Wenbo Zhu, Hao Qin, Abhishek Kumar, Jiande Wu, Raj Naidoo, Yan Deng, Xiangning He*

Harnessing explainable artificial intelligence to model the causes of unplanned power outages in renewable integrated electrical grids *Sakhile Twala, Rajendra Naidoo*

Grid-Forming Converters with Frequency & Voltage Active Support and Distributed Cooperative Control for Active and Reactive Power Sharing *Guangdi Li, Yaodong Zhang, Hao Gao, Bowen Zhou, Zhaoxia Xiao, Alexander Micallef, Maurice Apap, John Licari*

A Fully-Isolated Triple-Ports Bidirectional DC-DC Converter Based on Integration of Dual-ActiveBridge and LLC resonant Converter *qizhen wu, Zicheng Wang, Guangdi Li, Yunrong Chen, Hongchi Wang*

Bridging the Gaps in Smart Inverter Technologies for PV Systems: A Review of Global R&D Projects *Bikash Sah, Abhishek Kumar, Ramesh C Bansal, Yan Deng, Chushan Li, Xiangning He*

Room 215 B

Technical Track 02 - Electric Energy Storage Systems I

Chairs: Massimiliano Luna, Petr Musilek

Levelized Cost Analysis of Second-Life and New Lithium-ion Batteries in Microgrid Applications *Syed Muhammad Ahsan, Petr Musilek*

Multi-Domain Motor Cooling Simulation for Enhanced BEV Efficiency and Durability *Max Mauro Dias Santos, Calequela Manuel, Jean Franco, Vinicius Silva, Layhon Santos, Angelo Tusset*

A Unified Piecewise Modeling Framework for Battery Knee Point Detection and State of Health Estimation *Xueqi Xing, Tongtong Yan, Min Xia*

A Novel ARD-GPR Approach for Li-Ion Battery SoH Estimation Using Frequency Response Analysis *Vahid Mortezapour, Afshin Rezaei-Zare*

Enhancing Memory-Limited Feedforward Neural Networks for State of Charge Estimation through Temporal Feature Engineering *Mostafa Mahdi Yousef, Mohammad Shaterabadi, Houshang Karimi*

An Adaptive Kalman-Guided Soft Sensor Using Feedforward Neural Networks for SOC Estimation in Lithium-Ion Batteries *Mostafa Mahdi Yousef, Mohammad Shaterabadi, Houshang Karimi*

Distributed Resilient Secondary Control of Smart Grid Under FDI Attacks *JIN LI, Youmin Zhang*

Performance Comparison of a Full-Bridge Based Reconfigurable and Conventional Battery Storage System *Dominic Karnehm, Julian Estaller, Manuel Kuder, Antje Neve, Thomas Weyh*

Room 344

Technical Track 10 - Industrial Informatics: Cloud Computing, Big Data, AI, Informatics and Software Engineering II

Chairs: Max Santos

An Unsupervised Knowledge and Data Dual-Driven Based Fault Diagnosis for Industrial Process *Dandan Zhao, Rui Liu, yifan wu, Min Xia*

A model selection approach for Flexible Dirichlet Mixtures through Minimum Message Length *Seunghyun Hong, Fatma Najar, manar amayri, Nizar Bouguila*

Commissioning of industrial automation systems using IEC

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61499 *Pranay Jhunjhunwala, Valeriy Vyatkin*

LLM-Powered Framework for Interpretable Traffic Rule Processing in Autonomous Driving *Jean Carvalho, Felipe Forte, Hugo Kenji, Glaucia Melo dos Santos, Max Mauro Dias Santos*

Log-Based Anomaly Detection Without Ground-Truth: Evaluating Weakly Supervised, Semi-Supervised, and Unsupervised Deep Learning Approaches *Nadira Nipa, Nizar Bouguila, Zachary Patterson*

Making Room for Domain-Specific Algorithms in Big Data Compression Pipelines *Matheus Wagner, Antônio Augusto Fröhlich*

Generative AI Vibe Coding for Prototyping Industrial Systems *Daswin de Silva, Nishan Mills, Zafar Issadeen, Harsha Moraliyage, Andrew Jennings, Milos Manic*

LLM4VC: Harnessing Large Language Models for Virtual Commissioning of IEC 61499 Automation Systems *Tuojian Lyu, Valeriy Vyatkin, Udayanto Dwi Atmojo*

Room 215 A

Technical Track 12 - ICT and AI enabling smart cities, buildings, transport, agriculture, energy efficiency and sustainability I

Chairs: Daisuke Chugo, Tharrengini Suresh

Transfer Learning for Residential Electricity Load Forecasting in a Multi-Geographical Context *Zheng Grace Ma, Nicolai Bo Vanting, Bo Nørregaard Jørgensen*

Short-term EV load forecasting using Kolmogorov Arnold Networks *Belal Mahmud Fahim, Mohammad Kaosain Akbar, Manar Amayri*

Redesign and Subjective Evaluation of a Wearable Neck Support Device for Overhead work *Chengsong Yao, Sho Yokota, Akihiro Matsumoto, Daisuke Chugo, Hiroshi Hashimoto*

AI-Assisted Configuration of Reverberation Chambers for Precision RF Environments Emulation *Mohamed Kashef, Richard Candell*

Improving Wi-Fi Network Performance Prediction with Deep Learning Models *Gabriele Formis, Amanda Ericson, Gianluca Cena, Stefano Scanzio, Stefan Forsström, Kyi Thar*

Reinforcement Learning Environment for Demand Controlled Cabin Ventilation in Demand Response *Harri Aaltonen, Laura Häkkinen, Valeriy Vyatkin*

Hybrid Forecasting-Anomaly Detection Approach for Smart Building Energy Monitoring *Morcos Metry, Saima Sharma, Sama Allawi, Robert S Balog, Rabab Benotsmane*

Room 214

Women in Engineering Forum

Room 109

Technical Track 05 - Power Electronics & Energy Conversion II

Chairs: Hadi Y. Kanaan

Simplified analytical loss analysis for early exclusion of unsuitable MOSFET candidates *Aron Haselhoff, Sascha Kratz, Stefan Soter*

A Bidirectional Converter with High Voltage Gain Based on Isolated H-bridge and Active Bipolar Cockroft-Walton Voltage Multiplier *Nino Christopher Ramos*

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Flexible Synchronous Buck Converter Development Platform for Rapid Prototyping *Abir Ihsan, Mohamed Youssef, Sheldon Williamson*

Improved Low Voltage Ride-Through Control Strategy for Virtual Synchronous Generators Based on Deadbeat Predictive Current Control *Hongyu Feng, Xuyang Zhang, Jiasheng Xu, Haoqi Zhu, Hong Qin, Guozhu Chen*

An Induction Heating System Using High-Frequency Inverters Connected in Anti-Series *Takuo Kawarabayashi, Shohei Komeda*

Robust Control of Grid-Tied Inverter with LC Filter via Adaptive FCS-MPC Cost Function Optimization *Muhammad Haseeb Arshad, Qing Zhao, Mahmoud Kassas*

Single Phase Isolated Bidirectional Inverter with Battery Interface for Solar Energy Applications *Hyacinthe Tchakounte, Akrem Aljehaimi, Pragasen Pillay*

An Induction Heating System Using a Double-D-shaped Auxiliary Work Coil with Parallel Connection *Shohei Komeda, Shunta Inami, Ryota Inoue*

Room 338

Special Session 18 - High Performance and Intelligent Power Conversion Systems for Electrified Transportation

Chairs: Joao Martins, Qingsong Wang

A New Shared Flying Capacitor Multilevel Converter for SRM Drives *ALI YOUSEFI DARANI, Nasir Ali, Mehdi Narimani*

Developed Quasi Z-Source Inverter for Electric Vehicle Applications with Desired Boost Factor and Low Inductor Current *Afshin Rezaei-Zare, Sara Laali*

Cascaded Connection of Sub-Multilevel Inverters Based on Switched Capacitors *javad Nekoui, Neda Zahedi Saadabad, Qingsong Wang, Ambrish Chandra*

Enhanced Control Strategy for Wireless Power Transfer Systems Using a Self-Sustained Oscillating Control Technique *Bradley Kitzul Varshney, Javad Ebrahimi, Sayed Amir Hashemi, Suzan Eren*

Flexible Power Control for Dual-Source Inverters in Electric Vehicles *Hosein Ghojavand, Javad Ebrahimi, Suzan Eren*

A New Fault-Tolerant Three-Level T-Type Converter for SRM Drives in EVs/HEVs *Nasir Ali, Mehdi Narimani*

Novel H-Infinity Controller for DAB Converter under Constant Current Load *Ziyong Liu, Javad Ebrahimi, Suzan Eren*

Room 213 B

Virtual Session I

Chairs: Akash Samanta

Adaptive Model Predictive Control with a Torque-Reactance Observer for High-Efficiency PMSM Drives in Battery Electric Vehicles *Moustafa Magdi, Mujahed Aldhaifallah, Hegazy Rezk*

Enhancing Fuel Cell Hybrid Electric Vehicle Driving System Through Targeted DC Bus Voltage and Current Regulation *Slman Mohammed Abaker Ahmed, Mohamed MohamedAhmed, Mazen Mohamed, Md Shafiullah*

Leveraging TIGFET Polarity Control for Scalable Polymorphic Logic Design *Tika Ram Pokhrel, Mohammed Hanifa Begum, Vadapalli Siddartha, Alak Majumder*

Evaluating Variational Autoencoders for Synthetic Time Series Data

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Generation in Agricultural and Energy Applications *abdellah islam kafi, Antonio Sanfilippo*

AutoGrow RL - Adaptive input control of an IoT based Autonomous Greenhouse System for Precision Farming using Reinforcement Learning *Ramesh Kestur, Sai Keerthan Sirigiri, Sougandh Krishna, Vishnutha Sheela, Mahidhar Bobbala, Phani Pavan Kambhampati, Madhav Rao, Pavan Patil GM*

Deep Reinforcement Learning Applied to Electric Distribution Network Applications using Real Time simulation *Javier Urquizo, Josselyn Gallo, Domenica Apolo, Luis Pesantes, Sixifo Falcones*

Evaluating the impact of Electric Vehicle (EV) charging on a MV/LV distribution network using synrchronized Distribution-Level Phasor Measurment Unit (D-PMU) data *Abdullah Ajabbar*

Room 347

Technical Track 11 - Intelligent factory automation I

Chairs: Marcian Cristea, Luis Gomes

Autonomous Model for Research in High Automation *László Horváth*

FSOME++: Improving Few-Shot Anomaly Detection via Abnormal Sample Augmentation *Atefeh Gilvari, Rajeev Verma, Nasrin Tavakoli, Narayan Kar, Ziad Kobti*

FastRecon++: Enhancing Few-shot Anomaly Detection for Electric Vehicle Manufacturing *Nasrin Tavakoli, Rajeev Verma, Atefeh Gilvari, Narayan Kar, Ziad Kobti*

Exploring High-Level Petri Nets for Model-Driven Development of Digital Controllers *Joao Paulo Barros, Luis Gomes*

Enhancing Low-Light Image Reconstruction via Non-Autoregressive Transformers: A Mask-Aware Latent Integration Framework *Qianyue Wang*

Toward Automated Anomaly Detection and Categorization in Polymer Fiber Production *Aref Sayareh, Vimal Simha, Joshua Swamidas, Thiago Eustaquio Alves de Oliveira, Amilcar Soares, Vinicius Prado da Fonseca*

Autoregressive DRL for Multi-Robot Scheduling in Semiconductor Cluster Tools *Soohwan Cho, Jean Seong Bjorn Choe, Jong-Kook Kim*

Predictive Maintenance using Machine Learning *RAM CHANDRA PALSANIYA, Ravindra Patil, Rajkumar Thanu*

19:30-21:30

Gala Dinner

Gala Dinner - Westin Harbor Castle

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08:00-12:00

Registration

Registration

Speaker Room

Speaker Room 104

08:30-09:00

Main Auditorium

Keynote 6: Power at the Edge: Orchestrating Grid Resilience and Control Architectures - Dr. Anurag Srivastav, Pacific Northwest National Lab

Abstract:

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	The modern power grid faces unprecedented challenges as climate extremes and cyber threats test its limits, driving the need for more resilient systems. Power electronics-based devices at the edge—including Electric Vehicles (EVs), Inverter based Distributed Resources (IBRs), and industrial assets—have emerged as critical elements in this resilience equation. While industrial automation represents one important application, these technologies are fundamentally reshaping our entire approach to grid resilience. The proliferation of these resources creates a fundamental control challenge: centralized approaches provide system-wide coordination but may lack the speed needed during disruptions, while distributed control enables rapid response but risks fragmentation of grid objectives. This talk will demonstrate how strategically deployed power electronics-interfaced edge resources can provide essential services during extreme events. We'll examine how IBRs provide voltage support during wildfire-induced system constraints, how EV fleets can offer mobile power resources during hurricane recovery, and how industrial microgrids maintain essential services during widespread outages. The future grid requires not just advanced devices but sophisticated orchestration—blending centralized intelligence with distributed responsiveness to create truly resilient power systems. Bio: Anurag K. Srivastava holds the Raymond J. Lane Professorship and serves as Chairperson of the Computer Science and Electrical Engineering Department at West Virginia University. Additionally, he is an adjunct professor at Washington State University and a senior scientist at the Pacific Northwest National Lab. He earned his Ph.D. in electrical engineering from the Illinois Institute of Technology in 2005. Dr. Srivastava's research focuses on data-driven algorithms and tools for cyber-resilient electric energy systems. His impactful research projects have resulted in the implementation of tools at utility control centers, supported by over $66M in funding from entities such as the US Department of Energy, National Science Foundation, Siemens Corporate Research, Electric Power Research Institute, Schweitzer Engineering Lab, Power System Engineering Research Center, Office of Naval Research, and various National Labs. Over the years, he has held visiting positions at organizations including Réseau de transport d´électricité in France, RWTH Aachen University in Germany, PEAK Reliability Coordinator, Idaho National Laboratory, PJM Interconnection, Schweitzer Engineering Lab (SEL), GE Grid Solutions, Massachusetts Institute of Technology, and Mississippi State University. He is an IEEE Fellow, member of several CIGRE Working Groups (WGs), leading multiple IEEE technical subcommittee, WGs (Power System Operation, Resiliency, Microgrid, voltage stability, distributed optimization), and the author of over 400 technical publications, 3 books, and 3 patents.
09:00-09:30	*Main Auditorium* **Keynote 7: Energizing Security: Innovations for Safeguarding Industrial Power System - Dr. Deepa Kundur, UofT** Abstract: The increasing digitalization of industrial power systems including electric grids and electric vehicle charging infrastructure has introduced new cybersecurity risks alongside operational benefits. As these systems become more interconnected and intelligent, they are increasingly exposed to

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sophisticated threats capable of disrupting physical operations. This keynote will examine emerging innovations for safeguarding industrial energy systems, with a focus on the importance of attack detection, and the growing role of deep learning and artificial intelligence in threat identification and response. It will also address the risks posed by adversarial machine learning, the use of honeypots for cyber deception and intelligence, and the potential of quantum machine learning to shape future defenses. Drawing on both current developments and historical context, the talk will offer perspectives on cybersecurity challenges in industrial power systems and discuss promising directions for research and practice.
Bio:
Deepa Kundur is Professor & Chair of The Edward S. Rogers Sr. Department of Electrical & Computer Engineering at the University of Toronto. A native of Toronto, Canada, she received the BASc, MASc, and PhD degrees all in Electrical and Computer Engineering in 1993, 1995, and 1999, respectively, from the University of Toronto.

Professor Kundur's research interests lie at the interface of cybersecurity, signal processing and complex dynamical networks. She is an author of over 200 journal and conference papers. Professor Kundur has participated on several editorial boards and currently serves on the Advisory Board of IEEE Spectrum. She has served in numerous conference executive organization roles including as General Chair of the 2018 GlobalSIP Symposium on Information Processing, Learning and Optimization for Smart Energy Infrastructures, TPC Co-Chair for IEEE SmartGridComm 2018. Symposium Co-Chair for the Communications for the Smart Grid Track of ICC 2017, General Chair for the Workshop on Communications, Computation and Control for Resilient Smart Energy Systems at ACM e-Energy 2016, General Chair for the Workshop on Cyber-Physical Smart Grid Security and Resilience at Globecom 2016, General Chair for the Symposium on Signal and Information Processing for Smart Grid Infrastructures at GlobalSIP 2016, General Chair for the 2015 International Conference on Smart Grids for Smart Cities, General Chair for the 2015 Smart Grid Resilience (SGR) Workshop at IEEE GLOBECOM 2015 and General Chair for the IEEE GlobalSIP'15 Symposium on Signal and Information Processing for Optimizing Future Energy Systems.

Professor Kundur's research has received best paper recognitions at numerous venues including the 2015 IEEE Smart Grid Communications Conference, the 2015 IEEE Electrical Power and Energy Conference, the 2012 IEEE Canadian Conference on Electrical & Computer Engineering, the 2011 Cyber Security and Information Intelligence Research Workshop and the 2008 IEEE INFOCOM Workshop on Mission Critical Networks. She has also been the recipient of teaching awards at both the University of Toronto and Texas A&M University. She is a Fellow of the IEEE, a Fellow of the Canadian Academy of Engineering, and a Senior Fellow of Massey College.

Memberships/Awards
Senior Fellow, Massey College (2019) elected from prominent representatives of both academic and professional interests at the University of Toronto to participate in Massey College activities.
Fellow, Canadian Academy of Engineering (2016) for path-breaking

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	engineering research at the interface of information processing and cyber security. IEEE Electrical Power and Energy Conference Best Paper Award (2015) for paper entitled “An Evolutionary Game Approach to Predict Demand Response from Real-Time Pricing” by Lee and Kundur. IEEE Smart Grid Communications Conference Best paper award (2015) for paper entitled “A Systematic Approach to Delay-Adaptive Control Design for Smart
09:30-10:15	*Main Auditorium* **Industry Panel Session 5: Securing Power Systems in the Post-Quantum Era: Urgency, Challenges, and Solutions (Dr. Atefeh Mashatan)** Dr. Atefeh Mashatan, Canada Research Chair, Founding Director, Cybersecurity Research Lab, Associate Professor, TMU, Canada. (Moderator) Dr. Mohammadreza Arani, Assistant Professor, CRC in Smart Grid Cyber-Physical Security, TMU, Canada. Dr.Marthe Kassouf, Researcher at the Research Institute of Hydro-Quebec (IREQ), Canada. Dr. Brian Neill, Vice President at evolution, Canada. Outline: Quantum computers are advancing at a much faster pace than initially anticipated. While this revolutionary technology holds the potential to solve long-standing computational challenges, it also introduces unprecedented cybersecurity threats. Many cryptographic algorithms, once considered secure —requiring billions of years for classical computers to break—could be compromised in mere minutes by quantum computers. Industries such as finance and IT have already recognized this challenge and have proactively begun transitioning toward quantum-resistant security measures. Organizations like NIST and ETSI are actively working on standardizing Post-Quantum Cryptographic (PQC) algorithms. However, industrial control systems (ICS), including power systems, lag significantly in adopting quantum-safe cybersecurity practices. Power systems, as critical cyber-physical infrastructures, rely extensively on information and communication technology (ICT) and cryptographic protocols to ensure system security. Yet, their vulnerabilities to quantum-enabled cyber threats have not been systematically studied. While IT sectors have made significant progress in developing quantum-resistant security frameworks, these solutions have yet to be tested and adapted for operational technology (OT) environments, where system constraints and security priorities differ significantly from traditional IT settings. Unlike IT systems, which prioritize data confidentiality, OT systems emphasize availability and real-time operation, making their cybersecurity needs fundamentally different. Power grids, for instance, operate under extremely low-latency communication requirements, sometimes as short as 4 milliseconds, further complicating the adoption of new security protocols. Any cryptographic solution must be thoroughly tested and adapted for these stringent requirements. Additionally, OT components have much longer life cycles (10–20 years) compared to IT hardware, meaning that many existing power system devices

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	have limited computational capabilities to support complex quantum-resistant encryption techniques. This extended lifespan also creates cybersecurity challenges, as older, non-secure legacy devices will inevitably coexist with newly deployed quantum-resistant systems, leading to hybrid security risks. This panel will explore the pressing cybersecurity challenges of power systems in the post-quantum era, focusing on the gaps between IT and OT security measures, real-world implementation constraints, and practical strategies to ensure grid resilience. Chairs: Varaprasad Oruganti
09:30-10:30	*Room 302* **Special Session 15 - Advanced Control Techniques for Power Electronics Converters** Chairs: Li Chushan, Shima Shahnooshi **Reinforcement Learning-Based Control for Current Regulation and Capacitor Voltage Balancing in a Four-level Single Flying Capacitor Converter** *shima shahnooshi, Javad Ebrahimi, Alireza Bakhshai* **Evaluation of Classical and Reinforcement Learning Controllers for Motor Drives** *William Moreira, Cassiano Rech* **Evaluation of PWM Methods for Two-Level Voltage Source Inverters considering Efficiency, Power Losses Distribution and Harmonic Performance** *Juan Ramos Delgado, Abraham M. Alcaide, Jose Ignacio Leon, Alfonso Manchado, Eduardo Bascur, Leopoldo G. Franquelo*
	Room 344 **Technical Track 10 - Industrial Informatics: Cloud Computing, Big Data, AI, Informatics and Software Engineering III** Chairs: Nasrin Tavakoli, Hoa Tran-Dang **Distributed Learning-based Matching for Task Offloading in Dynamic Fog Computing Networks** *Hoa Tran-Dang, Kim Dong-Seong* **Toward Leveraging Large Language Models to Support Cybersecurity Risk Assessments in Industrial Component Development** *Lisa Gebauer, Marco Ehrlich, Sebastian Wolf, Luca Schäfer, Andreas Besginow, Henning Trsek* **Spectral Analysis of Heterogeneous Graph Representation for GNN Tasks on Electric Circuits** *Ahmed Khamis, Mohammed Agamy*
	Room 109 **Technical Track 13 - Human centric ICT enabling smart medicine, assistive robotics, security and Education and Ethics I** Chairs: Balakumar Balasingam, Julio C. Rodríguez-Quiñonez **Metro Passenger Flow Prediction with GNN: Station Attribute Influence Analysis** *Xinyi Zhou, Zachary Patterson, Nizar Bouguila* **Energy Audit of Public Building Energy Management System for Energy Efficiency** *Wesam Rohouma, Hamed Abufares, Huthaifa Ameen, Shady Khalil, Morcos Metry* **From Scratch to Twin: The Design of your First Human-Centric Digital Twin** *Francesco Biondani, Luigi Capogrosso, Marco Cristani, Franco Fummi* **Temporal Analysis of Cognitive Workload During Manual and Partial Driving Automation Based on the Detection Response Task** *Mobina*

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Mahmoodzadeh, Sooraj Sunil, Prarthana Pillai, Francesco Biondi, David L. Strayer, Joel M. Cooper, Amy S. McDonnell, Balakumar Balasingam

Room 338

Special Session 08 - Advanced Topologies, Control and Switching Techniques of Multilevel Inverters for Renewable Energy Applications

Chairs: Pragasen Pillay, Martin Ackermann

- **Model Predictive Control Strategy for Single-Phase Four-Cell Flying-Capacitor Totem-Pole PFC Converter with Integrated Power Pulsation Buffer** *Parth Patel, Ambrish Chandra*
- **A Reconstruction-Free Model Predictive Control Method with Reduced Switching Frequency for a Four-level Single Flying Capacitor Converter** *MATIN KESHAVARZI, Javad Ebrahimi, Alireza Bakhshai*
- **A Single-Source Three-phase Six-Level Flying Capacitor-Based Converter** *Javad Ebrahimi, Suzan Eren, Alireza Bakhshai*

Room 213 B

Virtual Session II

Chairs: Anindita Golder

- **Towards Prognosis on Interconnected Distributed Closed-loop Control System: A Data-Driven Perspective** *Jiusi Zhang, Jilun Tian, Liu Kexin, Hao Luo, Shen Yin*
- **Droop-Based State-of-Charge Balancing Approach for Energy Storage Units in Autonomous Microgrids** *Ali Akhavan, Saeed Golestan, Juan Vasquez, Josep Guerrero*
- **Virtual Inertia - based Distributed Consensus Control of Bi Directional Converter for Battery Energy Storage System in DC Microgrids** *Murali Krishna, DVSS Siva Sarma*
- **SoC - Based Virtual Inertia Emulation for Voltage Regulation and Power Sharing in Grid-Forming DC Microgrid** *Murali Krishna, DVSS Siva Sarma*

Room 347

Technical Track 08 - Instrumentation, Sensors, Actuators, Systems Integration and Nano-Technology I

Chairs: Gene Li, Andre Herrera Chavez

- **Ultrasonic Anemometer using Microphones** *Gene Li, Mehrdad Moallem, Patrick Palmer*
- **Autonomous Mining Truck Monitoring System Based on DigiMesh Networking** *Quamrul Huda, Lei Yang*
- **Transmitter Design for Indoor Microwave Wireless Power Transfer at 3 GHz** *Elham Norouzzadeh, Javad Ebrahimi, Alireza Bakhshai*

10:30-10:45

Lunch Area

Coffee Break

10:45-11:15

Main Auditorium

Keynote 8: Differential Geometric Methods for Power Electronics - Majid Pahlevani, Queen's University

Abstract:

Power electronics is the key technology for many existing and emerging

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applications such as renewable energy systems, electric vehicles, energy storage systems, LED lighting, telecommunication systems, etc. Power electronics technology primarily includes power electronic circuitry and control systems. Although power circuits perform the required power conversions, the control system is what is controlling the conversion. Thus, the control system is an integral part of this technology, which directly determines the system performance. Power circuits have reached some level of maturity within the last few decades, offering very high conversion efficiencies thanks to high-performance power semiconductors and highly efficient power circuit topologies. In contrast, the advancement in control systems for power electronics has only been restricted to scientific articles and traditional linear controllers are dominant in existing industrial power electronic converters for the most part. Traditional linear controllers cannot effectively deal with nonlinearities in power electronic converters. Thus, they result in suboptimal performance and minimal stability margins.

The main focus of this talk is to present new differential geometric control techniques tailored for power electronics technology. Differential geometry is the foundation of nonlinear control theory, and thus it can be used to effectively capture nonlinear behavior of power electronic converters. The proposed framework provides advanced tools to derive nonlinear models and design control techniques for power electronic converters on manifolds, where their nonlinear behavior can be fully characterized, accurate stability margins can be investigated, and optimal performance can be achieved.

Bio:
Majid Pahlevani (Senior Member, IEEE) received the Ph.D. degree in electrical engineering from Queen's University, Kingston, ON, Canada, in 2012. From 2008 to 2011, he collaborated with Freescale Semiconductor, Inc., where he was the Leader of a research team working on the design and implementation of the power converters for a pure electric vehicle. From 2011 to 2016, he was the Chief R&D Engineer, VP of Technology, and then, the CTO at SPARQ Systems, Inc. At SPARQ, he invented multiple innovative power circuitry and digital control techniques for SPARQ's main product, QUAD microinverter. From 2016 to 2019, he was an Assistant Professor with the University of Calgary, Calgary, AB, Canada. He is currently an Associate Professor with the Department of Electrical and Computer Engineering, Queen's University. He has conducted more than 20 industrial projects in renewable energy systems, energy storage systems, electric vehicles, and LED lighting. He has authored or coauthored more than 250 journal and conference proceeding papers and is the holder of 100 U.S. Patents (issued/pending).

Dr. Pahlevani is also an Associate Editor for IEEE JOURNAL OF EMERGING AND SELECTED TOPICS IN POWER ELECTRONICS and a Member of the IEEE Power Electronics Society. He was the recipient of numerous awards, such as the "Early Research Excellence Award" from Alberta, Canada, "Research Achievement Award" and multiple "Teaching Achievement Award" from the University of Calgary and Queen's University, "Engineering and Applied Sciences Outstanding Thesis" Award from Queen's University, "Research Excellence Award" from IEEE Canada, and "Distinguished Research Award" from the University of Calgary.

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10:45-12:15

Room 302

Special Session 02 - Advanced signal and image processing and AI techniques for condition monitoring of Electric Machines and Drives

Chairs: Pragasen Pillay

Induction Motor Temperature Prediction via Transfer Learning on Physics-Based Synthetic Data Using Deep Neural Networks *Amir Kermanizadeh, Pragasen Pillay*

Inclined Eccentricity Fault Diagnosis in Induction Motors using Deep Learning *Solihah Sharief Shiekh, Pragasen Pillay*

Room 344

Technical Track 07 - Motion Control, Robotics and Mechatronics III

Chairs: Rached Dhaouadi, Qingsong Wang

An Approach to Surrogate Physical Systems Based on Dimensional Analysis and LASSO Regression Demonstrated on a Flexible Multibody System *Frank Wolff, Matthias Thomas, Andreas Gienger, Oliver Sawodny*

Predictive Thermal Management for an Electric Vehicle Battery and Powertrain Circuit *Laura Kleckner, Moritz Brunschier, Oliver Sawodny*

Comparison of Dynamic Performance of Field Oriented Control and Model Predictive Control for Line Start Permanent Magnet Synchronous Machine *Mohamed Abido, Haseeb Arshad, Qing Zhao, Aboubakr Salem*

Multi-Scale Voting System for Robotic Tactile Texture Recognition on Uneven Surfaces *Soheil Khatibi, Maliheh Marzani, Ruslan Masinjila, Vinicius Prado da Fonseca, Thiago Eustaquio Alves de Oliveira*

Dynamic Voltage and Frequency Scaling (DVFS) Strategy for FPGA-Based Edge AI Inference *Qianyue Wang*

Observer-Based Robust Force Control of Endurance Test Equipment for Steering System *Insu Chung, Minhyeong Kim, Seongil Lee, Kanghyun Nam*

Room 109

Special Session 10 - Machine Vision, Control and Navigation II

Chairs: Tharrengini Suresh, Julio C. Rodríguez-Quiñonez

Hybrid Perception Loss-Driven Synthetic Images Generation of Pathological Myopia Stages *Andre Ivann Herrera Chavez, Wendy Flores-Fuentes, Julio Rodriguez, Eder Alejandro Rodriguez Martinez, Oleg Sergiyenko, Paolo Mercorelli, Moises J. Castro-Toscano*

Integrated Podiatric Measurement System for Anthropometric Angle Analysis and Plantar Load Distribution *Julio Rodriguez, Marla Sandoval-Jimenez, Dayanna Ortiz, Wendy Flores-Fuentes, gabriel trujillo, Moises J. Castro-Toscano, Oleg Sergiyenko*

Three-Dimensional Measurement through the Calibration of a Laser Profilometer. *Leonardo D. Medina-Madrazo, Moises J. Castro-Toscano, Julio Rodriguez, Wendy Flores-Fuentes, daniel Hernandez-Balbuena, Oscar Real-Moreno, Oleg Sergiyenko*

Energy-Efficient Predefined-Time Convergent Control Laws for PMSM Stabilization *Alison Garza-Alonso, Xiaoxiao Mi, Michael Basin*

Dilated Strip-wise Spatial Feature Pyramid: An Efficient Network for

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Object Detection *Harish Sundaralingam, Tharrengini Suresh, Akilan Thangarajah, Saad Bin Ahmed*

SS-DeepSeg: An Efficient DeepLab with Smart Scaling for Robust Semantic Segmentation *Tharrengini Suresh, Harish Sundaralingam, Saad Bin Ahmed, Akilan Thangarajah*

Room 338

Technical Track 03 - Power Systems, Renewable Energy Systems and Smart Grid IV

Chairs: Djaffar Ould Abdeslam, Li Chushan

Mitigating the effect of FDI Attacks on State Estimation in the Smart Grid *Sarita Paudel, Himanshu Buckchash, Rubén Ruiz-Torrubiano, Deepak Dhungana*

MPC-ADALINE Control Strategy for a Renewable Energy Powered Shunt Active Power Filter *Abdelbasset Krama, Wesam Rohouma, Morcos Metry, Mohd Zamri Che Wanik, Dhanup Somasekharan Pillai*

Dynamic Multi-Physics Modeling and Coordinated Control of Large-Scale PEM Electrolyzers *Abdallah Hassan, Mohamed Hafez, Hany Farag, Amir Asif*

Control Scheme with Zero Cancellation for Grid-Connected Inverters with LCL Filter *Pedro Roncero-Sánchez, Emilio José Molina-Martínez, Jaime Garcia-Jimenez, Alfonso Parreño-Torres, Francisco Javier López-Alcolea, Javier Vázquez*

Power Control of Virtual Oscillator-Based Inverters Using Virtual Impedance and Model Predictive Control *Sima Azizi Aghdam, Mohammed Agamy*

Room 213 B

Virtual Session 3

Chairs: Anindita Golder

Thyristors-Based Sub-Module with Hybrid Devices for Low-Loss Realization of Modular Multilevel Converter *Saeed Sharifi, Levi Bieber, Liwei Wang*

Enhanced Model Predictive Control for Dynamic Frequency Regulation in Grid-Forming Converters *Zhenyu GU, [illegible]*

Enhanced LVRT Control Based on Voltage Amplitude and Phase Compensation of OW-WFSM Interface Converter Device *[illegible] Zhenyu GU*

Rapid Model-Based Design and Real-Time Digital Twin Integration: An Offshore Robot Case Study *Ronny Landsverk, Johannes Arnesen Eidsvik, Mingda Zhu, Daniel Hagen, Jing Zhou*

Room 347

Technical Track 04 - Electrical Machines and Drives III

Chairs: Nasir Ali, Jerry Kan

Feasibility Study and Harmonic Analysis of Fractional-Slot Distributed Winding in Brushless Doubly Fed Machines *Malihe Heidary, Salman Abdi Jalebi, Ehsan Abdi Jalebi, Richard McMahon*

Analytical Modeling of Rotor Mechanical Stress for IPMSM with Variable V-Shaped Rotor Angles *Omar Naser Traboulsi, Ze Li, Narayan Kar*

Model-Free Predictive Current Controller with Ultra-local Model Utilizing a Novel Observer for Dual Three Phase PMSM *Haoyang Zhang, Jingru Yang, Subarni Pradhan, Babak Nahid*

A New Hybrid Modelling Technique for Predicting Permanent Magnet

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	Synchronous Motor Parameter Changes due to Temperature and Load *Kenneth Chinonso Odo, Pragasen Pillay* **Marine Electrification in Vessels, Decarbonization and Magnetohydrodynamic Engines** *kin lung jerry kan, martin tin, Sheldon Williamson*
11:15-11:35	*Main Auditorium* **Industry Talk: A low ripple 36 kV, 24 A crowbarless DC power converter for biasing sensitive RF amplifiers - Manmath Kumar Badapanda-** Abstract: This presentation details the design and development of a high-performance 36 kV, 24 A crowbarless DC power converter tailored for biasing sensitive high-power RF amplifiers such as klystrons and IOTs. The converter features a modular architecture with 72 series-connected DC-DC modules, enabling both low ripple and ripple-free operation, and eliminates the need for bulky crowbars. The system integrates a full-range 24-pulse rectifier input ensuring low harmonics (THD ≤ 6%) and high power factor (≥ 0.97) across all operating conditions. It incorporates an optimized control strategy combining feedforward and overriding feedback control for voltage stability (≤ 0.4%) and energy-limiting mechanisms validated by wire survivability tests. Active redundancy enhances system reliability, maintaining performance even with multiple module failures. The technology has been granted patents, successfully transferred to industry, and published in IEEE Transactions, marking a significant advancement in the global landscape of high-voltage DC power supplies for RF applications. Bio: Manmath Kumar Badapanda is working as Head, RF Power Supplies Section and a Board Member at Raja Ramanna Centre for Advanced Technology, Indore, a premier Research and Development organization under Department of Atomic Energy, Government of India. He has original and innovative contributions, having granted US patent No. 10027122B2 and Indian patent No. 436206, as their sole inventor and transferred several crucial technologies to industries, with impressive techno-commercial impacts. He has demonstrated exemplary technical leadership for advancement and development of power converter technology and has unique credibility that more than 500 number of his power converters (up to 100 kV, 25 A DC and 250 kV, 250 A pulsed), are in 24/7 and 365 days operations with various Indian national facilities, for more than a decade. He has published 145 papers in peer reviewed journals & conferences and delivered nearly 40 invited talks in India, South Korea, Spain, Germany and Switzerland, etc. He is a Senior Member, IEEE; Fellow, The Institution of Engineers (India) and Fellow, Indian National Academy of Engineering, India. He is Chair, IEEE Industrial Electronics Society; Chair, IEEE Power Electronics Society; IEEE Industry Applications Society; Chair, IEEE Systems Councils of Madhya Pradesh Chapter as well as Chair, Industry Relations Committee; Chair, Awards and Recognition Committee and Vice Chair of IEEE Madhya Pradesh Section, India during 2022-2025. Under his leadership, IEEE Madhya Pradesh Section, India has received “Best Membership Growth Medium Section Award-2022” and “Outstanding Medium Section Award-2023” from IEEE Region-10 (Asia-

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	Pacific) and IEEE Power Electronics Society Madhya Pradesh Chapter, India has received “Best PELS Medium Chapter Award-2025” from IEEE Power Electronics Society. He is a Member, Project Evaluation and Monitoring Committee for Indo-Taiwan Science and Technology Cooperation Program of Department of Science and Technology, Government of India and Panel Adviser, Union Public Service Commission, New Delhi, India. He has received a dozen of prestigious awards including “Technologist of the Year-2023” from the IEEE India Council, India; “Research Excellence Award-2023” from The Institution of Engineers (India), two numbers of IEEE section Awards and four numbers of “Department of Atomic Energy Awards for Excellence in Science, Engineering and Technology” from the Government of India, in the year 2008, 2013, 2016, 2017 & so on. Chairs: Varaprasad Oruganti