



28th International Symposium on Industrial Electronics (ISIE), held Wednesday through Friday, 12–14 June 2019, at Pinnacle Hotel Harbourfront, Vancouver, Canada.



**IEEE INDUSTRIAL ELECTRONIC SOCIETY
Young Professionals & Students (YPS)**

Activity Day

**Chairs: Yang Shi, Kunwu Zhang, Hani Vahedi, Christian Rojas, Marek Turzynski,
Aleksander Malinowski, Adam Milczarek, Sertac Bayhan, Andres Nogueiras Melendez,
Marek Jasinski**

Wednesday, 12.06.2019

AGENDA

13:30 - 14:15

Message to Young Professionals & Students from the IES

President Prof. Xinghuo Yu, VP for Membership Yousef Ibrahim,
Women In Engineering Lucia Lo Bello, IES Chapters Kim Fung Tsang,
Student & Young Professionals Activity Committee Chair Marek Jasinski

14:15 - 15:45

***Invited speakers under the
Young Professionals & Students Tutorial and Industry Link.***

**Complexity and modularity in high-power SiC converter architectures,
by prof. Robert W Erickson, University of Colorado Boulder.**

**PUC5 Converter – A Smart Promising Multilevel Converter Topology for Power Industry,
by dr Hani Vahedi, Ossiaco Inc, Montreal, Canada.**

**The future with AI – Sci-Fi or reality,
by prof. Milos Manic, Virginia Commonwealth University**

16:00 - 17:00

***IES-SYPA recipients
3 Minute Speeches Session of Young Professionals & Students***

IES-SYPA Travel costs reimbursement procedure in Concur,
by prof. Milos Manic, IES Treasurer, Virginia Commonwealth University

Thursday, 13.06.2019

13:30 - 15:30

Young Professionals and Students Forum I

16:00 - 17:00

Young Professionals and Students Forum II

YPS Publication opportunity in IEEE IES Media,
by prof. Mariusz Malinowski, IES Vice President for Publication, Warsaw University of Technology

YPS Closing remarks,
by prof. Marek Jasinski, Student & Young Professionals Activity Committee Chair, Warsaw University of Technology

19.00 - 21.00 At the Conference Gala Dinner

***Party and meet-up for Young Professionals & Students
Young Professionals & Student Diploma Ceremony***

*The diplomas will be distributed by IES President, IES Treasurer, Conference General Chair, IES VP for Membership,
and IES Student & Young Professionals Activate Committee Chair.
Should you have any questions, please contact Marek Jasinski at marek.jasinski@ieee.org.*

For updates please see: <http://www.ieee-isie2019.org/student.html>

Subscribe IES at YouTube: <https://www.youtube.com/channel/UCKg8GNii0Q-ieXE56AXosGg>



*Invited speakers under the
Young Professionals & Students Tutorial and Industry Link.*

Mentor Keynote speaker



Complexity and Modularity in High-Power SiC Converter Architectures

Prof. Bob Erickson

Colorado Power Electronics Center and ECEE Department
University of Colorado Boulder

Abstract: Commercial Silicon Carbide MOSFETs rated at 650 V to 10 kV are enabling power conversion applications with much higher voltage and power, and with significantly increased switching frequencies and power densities. A current research topic of substantial interest is highly modularized converter system architectures using these devices, to extend power conversion technologies to applications having power, voltage, and frequency/power density levels not previously achieved. Converter approaches that merely substitute wide bandgap semiconductors for silicon devices achieve only an incremental improvement in performance. These higher power applications employ multiple semiconductor die and often have multilevel switching and multiple modules.

Significant non-incremental improvements in efficiency, power density, and mean time to failure (MTTF) can be achieved through more complex converter topologies that employ multilevel switching to reduce magnetics loss and size, and parallel phase shifted control to reduce capacitor RMS current. The recent composite converter approach further addresses the fundamental power conversion mechanisms of direct and indirect power conversion, to provide a solution for improvement of high boost ratio efficiencies in hybrid electric vehicle applications. This approach was demonstrated to achieve a 4x reduction in average loss over standard drive cycles, with commensurate reductions in temperature rise.

A typical complaint regarding highly modularized converter systems is the increased parts count that could lead to decreased reliability as measured by MTTF. This problem can be overcome by modularized systems that achieve significant reductions in average loss and temperature rise. The Arrhenius equation predicts that failure rate is an exponential function of temperature, and hence significant improvements in efficiency can overcome the increase in component count. An electric vehicle dc-dc converter example will be discussed.



Biographical Sketch

Prof. Robert Erickson is a Professor and Chair in the Department of Electrical, Computer, and Energy Engineering at the University of Colorado – Boulder. Dr. Erickson is a Director of the Colorado Power Electronics Center, and an author of the textbook, *Fundamentals of Power Electronics*, currently in its second edition. Dr. Erickson has been recognized as a Fellow of the IEEE and a Fellow of the joint DOE National Renewable Energy Laboratory and University of Colorado Renewable and Sustainable Energy Institute (RASEI). Dr. Erickson earned the B.S. (1978), M.S. (1980), and Ph.D. (1983) degrees at the California Institute of Technology, Pasadena, California. For thirty-six years, Dr. Erickson has taught courses on power converters and other electrical engineering courses at the University of Colorado, Boulder. Dr. Erickson's research is in the area of power converter technologies, topologies, modeling, and control, and he is a recipient of awards including the UC Boulder Inventor of the Year and IEEE Transactions on Power Electronics Prize Paper.

*Invited speakers under the
Young Professionals & Students Tutorial and Industry Link.*

YP Industry Link



PUC5 Converter – A Smart Promising Multilevel Converter Topology for Power Industry

Abstract: Multilevel converters have received significant attention for improved power quality. Moreover, replacing isolated DC sources with voltage-controlled capacitors makes this technology much more appealing for the industries due to reduced cost and size. Complicated controllers or auxiliary circuit to make necessary paths for capacitors' currents are some solutions for such topologies. However, advanced balancing techniques with interesting feature of redundant switching states are preferred to generate same voltage level, using different current paths, and balance the capacitors voltages without requiring external controllers. Thus, the voltage balancing of the DC capacitors in Multilevel Converters is a matter of importance especially in rectifiers and grid-connected inverter applications such as battery chargers, active filters, STATCOM, DVR, etc. Moreover, being Single-DC-Source topology is an important key to find a way into industry and market. Using more than one isolated DC sources make the design so much complicated and costly. The newly emerged 5-Level Packed U-Cell (PUC5) inverter topology has been introduced by Vahedi et al and has both advantages of being single-DC-source and balancing the flying capacitor through redundant switching states. It will be investigated in this tutorial considering the design criteria, switching technique, voltage balancing of DC capacitor and switches voltages ratings. As well, it is compared with other popular multilevel inverter topologies such as 3-level full-bridge (FB), 5-level cascaded H-bridge (CHB), neutral point clamped (NPC) and T3, in terms of components count, voltage balancing complexity, voltage rating, switching frequency, etc.

Currently, this topology is licensed to and being commercialized by Ossiaco Inc, Montreal, Canada.



Dr. Hani Vahedi received his B.Sc. and M.Sc. degrees in Power electrical engineering from K. N. Toosi University of Technology (KNTU), Tehran, IRAN in 2008 and Babol University of Technology, Babol, IRAN in 2011, respectively. He received his PhD with honor from École de Technologie Supérieure (ÉTS), University of Quebec, in Montreal, Canada in 2016.

He is the recipient of Best PhD Thesis Award for the academic year of 2016-2017 from ETS. He has published more than 60 technical papers in IEEE conferences and Transactions as well as one book in Springer. He has received best paper and presentation awards as well as travel assistance in numerous international conferences. He is an active member of IEEE Industrial Electronics Society (IES) and its Student & Young Professionals (S&YP) committee. He is a co-chair of special sessions, co-organizer of S&YP Forum and co-chair of 3M video session in IES conferences. He also serves as an Editor for International Transactions on Electrical Energy Systems, published by John Wiley & Sons Ltd. He is the inventor of PUC5 converter and holds 3 US patents and transferred that technology to the industry. Currently, he is a power electronics designer at Ossiaco Inc, Montreal, Canada.

His research interests include power electronics multilevel converters topology, control and modulation techniques, power quality, active power filter, and their applications into smart grid, renewable energy conversion, UPS, battery chargers and electric vehicles.



*Invited speakers under the
Young Professionals & Students Tutorial and Industry Link.*

Academia Tutorial



The future with AI – Sci-Fi or reality

Abstract: This talk will tackle provocative questions of future of AI. What happens when machine intelligence reaches human level and becomes sentient and self-aware? Will we have to consider it an intelligent life form? What will be the relationship with our creation?

This talk will start with brief overview of AI over the several decades, including what is currently considered state of the art Artificial Intelligence/Machine Learning techniques. The talk will continue with views and reasons for adoption but also resistance towards AI. The talk will provide insight into the latest trends in deep and adversarial learning, trustworthy and explainable intelligence, and present the challenges and directions in which AI/ML techniques are developing. The presentation will conclude with the vision for the future of AI and towards the society in which AI will (or is already) and integral part of life.



Dr. Milos Manic is a Professor with Computer Science Department and Director of VCU Cybersecurity Center at Virginia Commonwealth University. He completed over 30 research efforts in the area of data mining and machine learning applied to critical infrastructure protection, energy security, and resilient intelligent control, and human-machine interaction. Dr. Manic has given over 30 invited talks around the world, authored over 200 refereed articles in international journals, books, and conferences, holds several U.S. patents, and has won 2018 R&D 100 Award for *Autonomic Intelligent Cyber Sensor (AICS)*.

Dr. Manic is an IEEE Industrial Electronics Society (IES) Officer and is a member of various standing and technical committees and boards of this Society. He is also involved in various capacities in Technical Committees on Education, Industrial Informatics, Factory Automation, Smart Grids, Standards, and Web and Information Committee, and is a co-founder and past chair of Technical Committee on Resilience and Security in Industry, and a general chair of IEEE IECON 2018, IEEE HSI 2019.



*IES-SYPA recipients
3 Minute Speeches Session of Young Professionals & Students*

VF-011118	Deepak Ronanki, Univeristy of Ontario Institute of Technology, Canada, dronanki@ieee.org	Hybrid State of Charge Estimation Approach for Lithium-ion Batteries using k-Nearest Neighbour and Gaussian Filter-based Error Cancellation	Manjot Singh Sidhu, Deepak Ronanki, Sheldon Williamson
VF-010731	Sadeeshvara Silva Thotabaddadurage, University of Waikato, New Zealand (Aotearoa), sus1@students.waikato.ac.nz	Investigating the impact of ferrite magnetic cores on the performance of supercapacitor assisted surge absorber (SCASA) technique	Sadeeshvara Silva Thotabaddadurage, Nihal Kularatna, Alistair Steyn-Ross
VF-016381	Serhat Tekin, Istanbul Technical University, Turkey, tekinserh@itu.edu.tr	Remotely Accessible Open Test Platform for CPS Transportation and CAV Research	Eren Cakmak, Serhat Tekin, Aykut Ozdemir, Orion Lawlor, Seta Bogosyan
VF-012327	Kenan Yong, Nanjing University of Aeronautics and Astronautics, China, yongkenan@outlook.com	Wind Estimation-based Robust Flight Control for UAV with Active Maneuverability Limit	Kenan Yong, Qingxian Wu, Mou Chen
VF-010162	Sushil Silwal, Mississippi State University, Starkville, MS 39759, USA, ss2821@msstate.edu	Impact of Feed-forward and Decoupling Terms on Stability of Grid-Connected Inverters	Sushil Silwal, Masoud Karimi-Ghartemani, Houshang Karimi, Roshan Sharma
VF-015113	Zhenhuan Ding, Binghamton Univeristy, United States, zding1@binghamton.edu	A Behind-the-Meter Battery Control Algorithm with the Consideration of Li-ion Battery Degradation	Zhenhuan Ding, Ziang Zhang
VF-009717	Saran Satsangi, IIT Roorkee, India, anujsat2006@gmail.com	Energy Savings Estimation Considering Volt/VAr Optimization and Distributed Generation	Saran Satsangi, Ganesh Kumbhar
VF-010707 (diploma)	Paul Frutos, Universidad San Francisco de Quito, Ecuador, pfrutosg@usfq.edu.ec	Quad-Active-Bridge as the basic cell of a MMC Based SST for DER and DESS Integration	Paul Frutos, Fernando Briz, Alberto Sanchez, Juan Manuel Guerrero



VF-011215	Lucas Matiuzzi Kunzler, Concordia University, Canada, luccasmk@gmail.com	Hybrid Single Phase Wide Range Amplitude and Frequency Detection with Fast Reference Tracking	Lucas Matiuzzi Kunzler, Luiz A. C. Lopes
VF-007501	Juanting Xu, Shanghai Jiaotong University, China, xujt17@sjtu.edu.cn	Game-theoretic Energy Management with Velocity Prediction in Hybrid Electric Vehicle	Juanting Xu, Amro Alsabbagh, Dongxiang Yan, Chengbin Ma
VF-010863	Xiang Peng, University of British Columbia, Canada, xiangpeng2017@alumni.ubc.ca	Parameterizing Magnetic Flux Leakage Data for Pipeline Corrosion Defect Retrieval	Xiang Peng, Chengkai Zhang, Uchenna Anyaoaha, Kevin Siggers, Zheng Liu
VF-010227	Fulong Li, Aston University, United Kingdom, lif12@aston.ac.uk	Virtual Negative Cable Resistance for Power Sharing Accuracy Enhancement in DC Microgrids	Fulong Li, Zhengyu Lin, Jiande Wu, Wuhua Li
VF-011312	Arthur A. Z. Soares, MídiaCom Labs, Brazil, arthurazs@midia.com.uff.br	An Efficient Authentication Mechanism based on Software-Defined Networks for Electric Vehicles	Arthur A. Z. Soares, Diogo M. F. Mattos, Yona Lopes, Dianne S. V. Medeiros, Natalia C. Fernandes, Débora C. Muchaluat-Saade

**IES-SYPA Travel costs reimbursement procedure in Concur,
by prof. Milos Manic, IES Treasurer, Virginia Commonwealth University**



28th International Symposium on Industrial Electronics (ISIE), held Wednesday through Friday, 12–14 June 2019, at Pinnacle Hotel Harbourfront, Vancouver, Canada.



Young Professionals and Students Forum I

13:30 - 13:50

VC-010162

Impact of Feed-forward and Decoupling Terms on Stability of Grid-Connected Inverters
Sushil Silwal, Masoud Karimi-Ghartemani, Houshang Karimi, Roshan Sharma

13:50 - 14:10

VC-016136

Novel PWM Technique for Quasi Switched Boost Converter for the Nano-grid Applications
Mohammad Meraj, Atif Iqbal, Naser M Al Emadi, Syed Rahman, Sagar Mahajan

14:10 - 14:30

VC-004952

A New Basic Unit for Symmetric and Asymmetric Cascaded Multilevel Inverters with Reduced Power Electronic Devices
Maryam Sarebanzadeh, Mohammad Ali Hosseinzadeh, Ebrahim Babaei, Marco Rivera, Patrick Wheeler

14:30 - 14:50

VC-012815

New High Gain 2LC-Y Multilevel-Boost-Converter (2LC-Y MBC) Topologies for Renewable Energy Conversion: Members of X-Y Converter Family
Shima Sadaf, Nasser Al-emadi, Atif Iqbal, Mahajan Sagar Bhaskar, Mohammad Meraj

14:50 - 15:10

VC-004987

New Reduced Asymmetric Basic Module Multilevel Converters for Cascaded Configurations
Mohammad Ali Hosseinzadeh, Maryam Sarebanzadeh, Marco Rivera, Patrick Wheeler

For updates please see: <http://www.ieee-isie2019.org/student.html>

Subscribe IES at YouTube: <https://www.youtube.com/channel/UCKg8GNii0Q-ieXE56AXosGg>





28th International Symposium on Industrial Electronics (ISIE), held Wednesday through Friday, 12–14 June 2019, at Pinnacle Hotel Harbourfront, Vancouver, Canada.



Young Professionals and Students Forum II

16:00 - 16:20

VC-007269

An Efficient Hybrid DE -WOA algorithm for Numerical Function Optimization

Zhongyu Wang, Yaru Li, Yingqi Tang

16:20 - 16:40

VC-010863

Parameterizing Magnetic Flux Leakage Data for Pipeline Corrosion Defect Retrieval

Xiang Peng, Chengkai Zhang, Uchenna Anyaoha, Kevin Siggers, Zheng Liu

16:40 - 17:00

VC-004979 (c) Genetic Algorithm Technique for 7-Level Cascaded H-Bridge Multilevel Converter THD Minimization

Maryam Sarebanzadeh, Mohammad Ali Hosseinzadeh, Ali Salehi, Marco Rivera, Patrick Wheeler

YPS Publication opportunities in IEEE IES Media,
by **prof. Mariusz Malinowski**, IES Vice President for Publication,
Warsaw University of Technology

YPS Closing remarks,
by **Prof. Marek Jasinski**, Student & Young Professionals Activity Committee
Chair, Warsaw University of Technology

Join IEEE IES and enjoy future offer (next page ...)

For updates please see: <http://www.ieee-isie2019.org/student.html>

Subscribe IES at YouTube: <https://www.youtube.com/channel/UCKg8GNii0Q-ieXE56AXosGg>





28th International Symposium on Industrial Electronics (ISIE), held Wednesday through Friday, 12–14 June 2019, at Pinnacle Hotel Harbourfront, Vancouver, Canada.



Join IEEE IES and enjoy future offer:

IEEE IES Student & Young Professionals Activity Committee (SYP-AC)
Program for the IES Conferences ver20190606



IEEE IES Student and Young Professionals Activity Committee + IES Growth Centre Project

The outstanding support for IEEE IES conferences and their participants! We offer:

- ✓ The IES Young Professionals & Students Paper Assistance (IES-SYPA). Please note that Young Professionals (**also, doctors and young professors are included**) could obtain the USD 2000 assistance to attend the conference.
- ✓ The Young Professionals & Students Tutorials and Industry Links – excellent place were invited speakers will share their experience with all conference attendees. IES SYP-AC selects the speakers and cover their travel expenses!
- ✓ The Young Professionals & Students Forum - where young authors will share their knowledge with all conference attendees. IEEE IES reserved USD 3000 for recognition of the best papers and presentations.
- ✓ Young Professionals & Students Party. Where IEEE IES Officers including the IES President and well know researchers exchange their experiences with younger IES members and future members in relaxing atmosphere. IEEE IES reserved USD 4000 (for a conference chairperson support) to sponsor this event. In case of large number of young attendees, the support would be even increased!
- ✓ IES Young Professionals & Students Paper Assistance (IES-SYPA) 3 minute speeches with 3-minute videos to promote projects of awarded authors. IEEE IES reserved for this more than USD 100 000 annually!
- ✓ Diplomas ceremony of the IES-SYPA during the Gala Diner to promote young researcher and conference!
- ✓ IES Growth Centre Project - see more in (<http://www.ieee-ies.org/pubs/industrial-electronics-magazine>)

Join IEEE IES and enjoy our outstanding scientific conferences! We support you and your industry education.
Visit us at <http://www.ieee-ies.org/>.

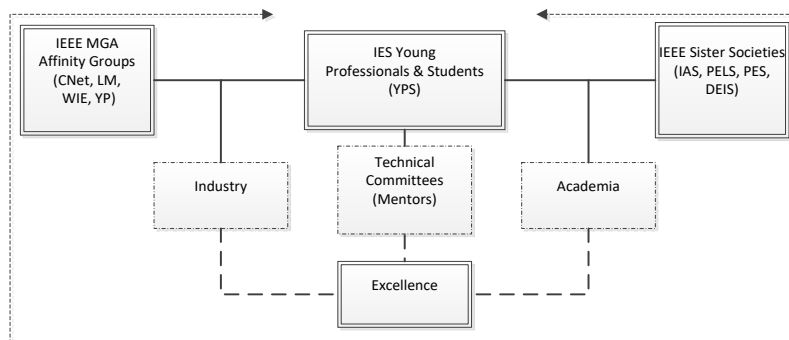
Organizers

- Prof. Marek Jasinski (marek.jasinski@ieee.org);
- Prof. Dmitri Vinnikov (dmitri.vinnikov@ieee.org);
- Dr Christian Rojas (christian.rojas@usm.cl);
- Dr Marek Turzynski (marek.turzynski@pg.edu.pl);
- Dr Hani Vahedi (hani.vahedi@ieee.org);
- Dr Adam Milczarek (adam.milczarek@ee.pw.edu.pl);
- Dr Hong Li (hli@bjtu.edu.cn);
- Dr Sertac Bayhan (sertac.bayhan@qatar.tamu.edu);
- Prof. Aleksander Malinowski (olekmali@bradley.edu);
- Prof. Andrés-IES-A. Nogueiras Meléndez (aaugusto_ies@gmx.com)



IEEE IES Young Professionals & Student (YPS) cooperation inside Society and outside of the Society: IES YPS party at bowling.

Chair of IEEE IES Student & Young Professionals Activity Committee
Marek Jasinski



IEEE Industrial Electronics Society Affinity Groups (LM, YPS, WIE)
new initiatives plan for cooperation with
IEEE Knowledge and Local Communities

For updates please see: <http://www.ieee-isie2019.org/student.html>

Subscribe IES at YouTube: <https://www.youtube.com/channel/UCKg8GNii0Q-ieXE56AXosGg>

