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ICRERA 2021

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Istanbul, Turkey

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10th INTERNATIONAL CONFERENCE on RENEWABLE ENERGY RESEARCH and APPLICATIONS (ICRERA 2021)

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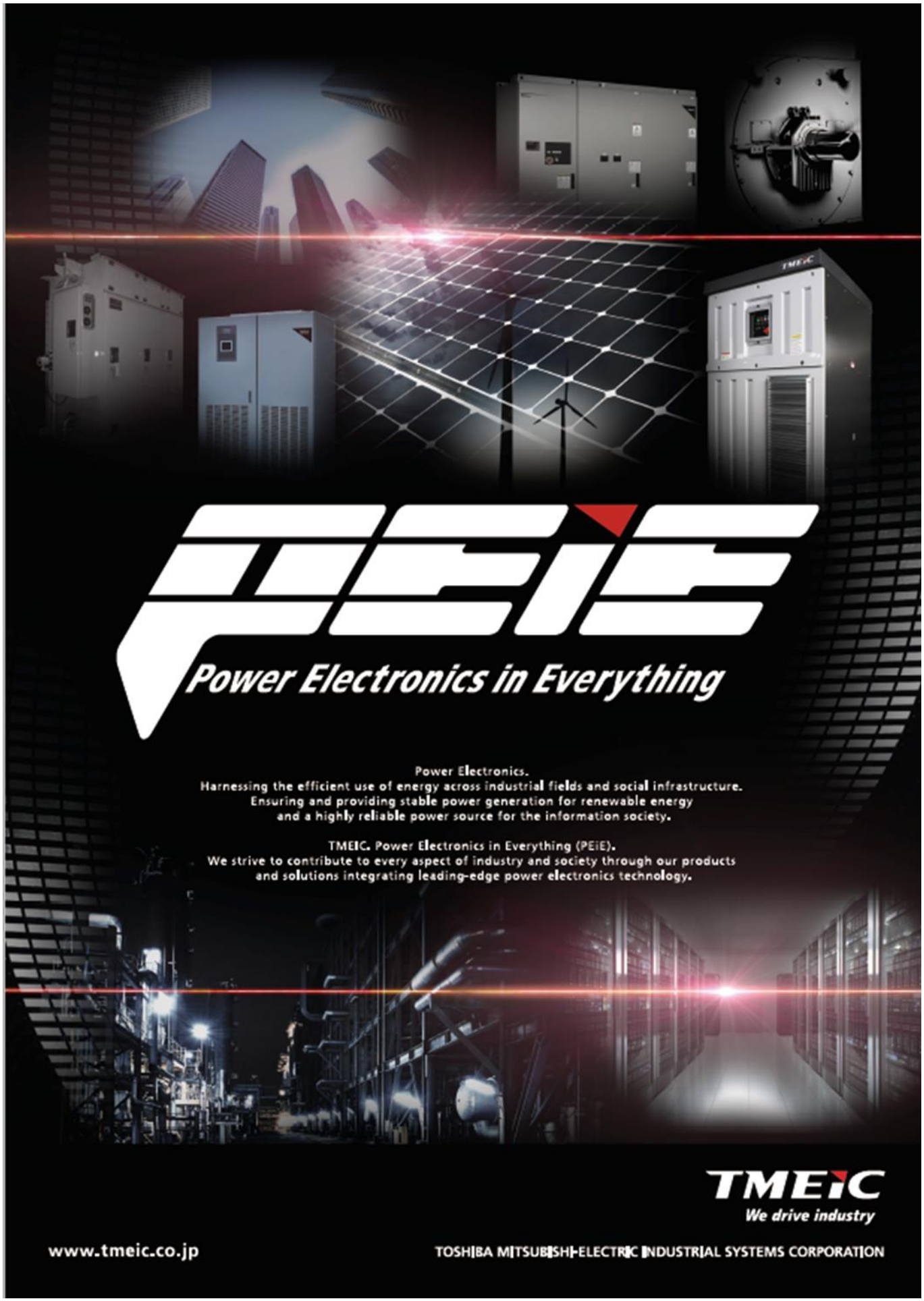

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TOPICS

Topics within the scope of the conference include the following areas, but not limited to:

- Renewable (Green) Energy Systems and Sources (RESSs) as Wind Power, Hydropower, Solar Energy, Biomass, Biofuel, Geothermal Energy, Wave Energy, Tidal energy, Hydrogen & Fuel Cells, Energy Storage
- New Trends and Technologies for RESSs
- Policies and Strategies for RESSs
- Energy Transformation from Renewable Energy System (RES) to Grid
- Novel Energy Conversion Studies for RESs
- Power Devices and Driving Circuits for RESs
- Control Techniques for RESs
- Grid Interactive Systems Used in Hybrid RESs
- Performance Analysis of RESs
- Hybrid RESSs
- Decision Support Systems for RESSs
- Renewable Energy Research and Applications for Industries
- RESSs for Electrical Vehicles and Components
- Artificial Intelligence and Machine Learning Studies for RESs and Applications
- Computational Methods for RESSs
- Energy Savings for Vehicular Technology, Power Electronics, Electric Machinery and Control, etc.
- New Approaches in Lightings
- Public Awareness and Education for Renewable Energy and Systems
- Reliability and Maintenance in RESSs
- Smart grids and RESSs
- Safety and Security of RESSs
- Renewable Energy Systems in Smart Cities
- Future Challenges and Directions for RESSs
- IoT for RESSs
- Energy Management, VPP(Virtual Power Plant) and ERAB (Energy Resource Aggregation Businesses) for RESSs
- Model based Design and Digital Twin for RESSs

LANGUAGE

The working language of the ICRERA conference is English

WELCOME to ICRERA 2021

Dear Colleagues,

The purpose of the International Conference on Renewable Energy Research and Applications (ICRERA) 2021 is to bring together researchers, engineers, manufacturers, practitioners and customers from all over the world to share and discuss advances and developments in renewable energy research and applications.

After the success of the first nine editions of ICRERA in Nagasaki (2012), Madrid (2013), Milwaukee (2014), Palermo (2015), Birmingham (2016), San Diego (2017), Paris (2018), Brasov (2019), and Glasgow (2020), the tenth edition will be in Istanbul, Turkey, and will continue focusing on several key topics and technologies related to renewable (green) energy systems and sources.

It is our happiness to share with you that 49 selected papers out of 87 papers at ICRERA2020 have been proposed for possible publications in IEEE Transactions on Industrial Applications (8 papers), International Journal of Renewable Energy Research (12 Papers), International Journal of Smart Grid (17) and International Journal of Engineering Science and Applications (12). We hope to select similar rate of papers for the ICRERA 2021.

Up to 2020, all papers presented ICRERA have been cited in IEEE Xplore, SCOPUS and Web of Science (Clarivate Analytics).

According to WEB of Science (Clarivate Analytics);

h-index = 14

Average citation per item = 1.97

Impact Factor = 4.16

ICRERA aims to present important results to the international renewable energy community in the form of research, development, applications, design, and technology. It is therefore intended to assist researchers, scientists, manufacturers, companies, communities, agencies, associations and societies to keep abreast on new developments in their specialties and to unite in finding alternative energy solutions to current issues such as the greenhouse effect, sustainable and clean energy issues.

Professor Ilhami COLAK
General Chair, ICRERA 2021

Professor Seref SAGIROGLU
Co-Chair, ICRERA 2021

Professor Fujio KUROKAWA
Co-Chair, ICRERA 2021

KEYNOTE SPEAKERS

Keynote 1: Mr. Masayuki TOBITA, TMEIC, Japan
Date : September 27, 2021 09.40-10.40 AM

Biography:

Mr. Masayuki Tobita graduated from master course of Electrical and Electronic Engineering, Tokyo Institute of Technology in 1994, where he majored in Power Electronics.

He joined Toshiba Corporation in April 1994, developed his carrier as the engineer and made excellent technical achievements in high-capacity power electronics applications. In October 2003, he moved to Toshiba Mitsubishi-Electric Industrial Systems Corporation (TMEIC), Tokyo, Japan, when the joint venture between Toshiba and Mitsubishi-Electric was established. At that time, he was Specialist of Power Electronics Department. He became Senior Manager of Power Electronics Department in 2013 and Senior Manager of Energy & Environment Power Electronics Systems Department in 2014. He became Senior Manager of Planning & Administration Department in 2017. He was President & CEO of Power Electronics Products Corporation in Houston from 2019. From June 2021 to present, he is Vice President of Power Electronics System division.

Contributions of Power Electronics to Carbon Neutrality

Summary: The world is now moving towards Carbon Neutrality triggered by COP 26 in 2020. The power electronics technology greatly contributes to Carbon Neutrality in four aspects. The first one is to form the future power network by increasing the renewables and the energy storage systems. The second is to form Grid Hydrogen system, a new energy network. The third is to reduce Carbon Footprint by promoting electrification and by improving efficiency of energy use. The final one is to support the digitalization for managing the future energy networks. The speech introduces some topics related to the aspects above in industrial fields.

At the beginning, the speech briefly addresses the global goal, Carbon Neutrality by 2050. Many countries committed to pursue the goal including EU, U.S. and Japan. Their policies refer the four aspects above to achieve the goal. Studying the policies, the concept of PEiE, Power Electronics in Everything, has been improved to cover all the four aspects.

The first topic is the power electronics for the renewables and the energy storage systems, ESSs. The speech introduces the key technologies for high power and high system efficiency for the industrial MW-range PV inverters. The speech also introduces the ESSs necessary for stabilizing the power grid by managing the power and energy from the renewables. The speech also shows great interests to the grid forming control for the inverters. The power electronics for the wind power generation is briefly introduced, too.

The second topic tries to cover Green Hydrogen. The power electronics technology is essential to form a new future energy network of Green Hydrogen, which is made with the electricity from the renewables. Quite large amount of hydrogen is necessary to replace the fossil fuels now used in the world. Very high DC current of kA is required in the electrolytic process for mass production of Green Hydrogen. The speech introduces such high current equipment. The speech also introduces the power electronics for transporting Hydrogen, for generating electricity from Hydrogen.

The third topic is Carbon Footprint reduction in industries. The speech introduces two ways for reduction, the electrification and the efficiency increase. Examples are introduced for electrifying heating process with MW range power electronics. By electrification, the fossil fuels for heating process can be switched to the green electricity. A good example of efficiency increase can be found in the motor applications. Motors are reported to consume more than half of the electricity in the world. The motor drive by inverters is well recognized for better system efficiency.

The fourth topic is related to the digital transformation. For achieving Carbon Neutrality, the digitalization is another essential technology to manage the future energy systems formed by tremendous numbers of renewables, energy storage systems including electric vehicles. The digital transition is made of two elements, the vast information in data centers and the hardware made on Silicon wafers. The power electronics technology, UPS, is essential to supply the stable power to the data centers. The other type of power electronics, MPC, multiple purpose converter, reinforce power supply systems in the semiconductor device factories for maintaining the hardware supply chain.

In the summary, the speech remarks that the power electronics technology is now embedded almost in everything. Then, in future, too, the concept of "PEiE", Power Electronics in Everything, will create new values by linking the power electronics in things. Through applications in various fields, PEiE firmly is believed to contribute to achieve Carbon Neutrality.

Keynote 2: Professor Seamus Garvey, Nottingham University, UK
Date : September 27, 2021 10.50-11.50 AM

Biography:

Seamus Garvey is Professor of Dynamics at the University of Nottingham. Since 2005, his research has focused increasingly on medium-duration energy storage and on the integration of energy storage with renewables (wind power in particular). He has written and spoken extensively on the need for energy storage over durations longer than one or two hours where existing battery solutions excel. Seamus co-founded and ran the internal Offshore Energy & Storage conference for 6 years (2014-2019) which concentrates on the integration of storage with offshore renewables and he is co-chair of the "Offshore Sustainable Energy Solutions" technical subcommittee of the IEEE Oceanic Engineering Society.

Four Distinct Durations of Energy Storage in Systems Powered Largely from Renewables

Summary: Apart from not emitting carbon dioxide or other greenhouse gases, most renewable energy sources differ from fossil-fuelled generation mainly in the profile of their output power. Some flexibility must be introduced to reconcile the supply of power from renewable sources with the natural demand for power. That flexibility can and will be sourced from some combination of (a) over-capacity with turn-down, (b) demand-side management, (c) interconnection to spread power geographically and (d) energy storage to spread power over time. What proportion of the flexibility will be sourced from each of these is a big unknown but it is likely that energy storage will make the dominant contribution. Energy storage itself spans a very wide range of timescales, power/energy scales and technologies. In this paper we explain that there are four main ranges of timescale for energy storage and we outline an approach to decomposing the flexibility required from energy storage into these four main ranges. The method does not produce the "optimum" solution but is simple to operate and gives very good answers – certainly adequate for planning system development.

Keynote 3: Professor Jun-ichi Itoh, Nagaoka University of Technology, Japan
Date : September 28, 2021 09.40-10.40 AM

Biography:

Jun-ichi Itoh was born in Tokyo, Japan, in 1972. He received his M.S. and Ph.D. degree in electrical and electronic systems engineering from Nagaoka University of Technology, Niigata, Japan in 1996, 2000, respectively. From 1996 to 2004, he was with Fuji Electric Corporate Research and Development Ltd., Tokyo, Japan and he was with Nagaoka University of Technology, Niigata, Japan as an associate professor. Since 2017, he has been a professor. His research interests are matrix converters, dc/dc converters, power factor correction techniques, energy storage system and adjustable speed drive systems.

He received the IEEJ Academic Promotion Award (IEEJ Technical Development Award) in 2007. In addition, he also received the Isao Takahashi Power Electronics Award in IPEC-Sapporo 2010 from IEEJ, Prizes for Science and Technology (Development Category) from the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, April 2017, 4th Nagamori Awards, 2018 and so on. Dr. Itoh is a senior member of the Institute of Electrical Engineers of Japan, the Society of Automotive Engineers of Japan and the IEEE.

Minimization Technologies for Smart Inverter Based On Circuit Topology and Its Control

Summary: The requirement of the high-power density for power converters becomes stronger and stronger even the smart inverters which are applied to PCS for PV, WPT and BESS. Nowadays, the volume of cooling system is smaller and smaller by appearing wide band gap devices such as SiC and GaN. In contrast, passive components such as inductor and capacitor dominate the volume of the power converter.

In this presentation, the minimization technologies for passive components which is used in the smart inverter are introduced with many kinds of circuit topology and control. The ac-to-ac direct power converters not requiring smoothing DC capacitor, the active power decoupling circuit reducing smoothing DC capacitor in the single-phase ac converters, the current discontinuous mode control reducing interconnection inductors and FRT control for minimum inductor will be presented.

Keynote 4: Professor Joao Martins, Universidade Nova de Lisboa, Portugal
Date : September 28, 2021 10.50-11.50 AM

Biography:

Joao Martins received his MsC in 1996 and his PhD in 2003 from Instituto Superior Técnico (IST), Technical University of Lisbon, Portugal. Currently he is an Associate Professor with Habilatation and Head of the Department of Electrical Engineering, Faculty of Sciences and Technology, NOVA University of Lisbon, Portugal. João Martins is senior researcher at UNINOVA-CTS, Portugal, where he coordinates the Energy Efficiency Group and integrates the Board of Directors. He is the co-author of more than 60 scientific articles in refereed journals and books and more than 180 articles in refereed conference proceedings. João Martins is an active member in various program committees of scientific conferences and serves as an associate editor of IEEE IES Industrial Electronics Magazine, IET Power Electronics and MDPI Energies. He was and is involved as member and/or project coordinator in several national and international research projects. In addition, he is an evaluator of research proposals and projects for several national and European funding agencies. João Martins is a senior member of IEEE, member of CIGRE, effective member of Engineers Association (Portugal) and founding member of the Portuguese Society for Education in Engineering (SPEE). His research interests are mainly in energy efficiency, alternative energies and power quality, intelligent and energy efficient buildings, heritage buildings, energy awareness, smart grid renewables integration.

Energy Flexibility as The Path Towards Sustainability

Summary: In many countries the increased use of renewable energy sources is in line with the increasing electrification of energy demand (for example, the replacement of traditional vehicles by electric vehicles or the replacement of heating systems based on fossil fuels, such as boilers by gas or oil, by electric heat pumps). These changes pose new challenges to the management of electricity systems, such as the inconstancy of the electricity supply or the drastic variations in loads over the course of a day, the operation of the electricity distribution network closer to its limits, the increased use of energy in the so-called peak periods, more complex control problems with faster decision times and smaller error margins. To tackle the aforementioned issues energy flexibility is a valuable tool towards a more sustainable electrical system. Flexibility can be defined as the power system's ability to respond to both expected and unexpected changes, either in demand or in supply-side. This concept contributes to improve the grid's stability allowing a higher penetration of renewable energy sources. The establishment and operation of flexible energy communities, which will bring advantages either to consumers either to the energy grid itself, should be based on four principles: flexibility, interconnectivity, bi-directionality and complementarity. Despite obvious grid advantages of flexible energy communities there are some questions that may be posed. Are there any negative technical impacts on the grid or on grid equipment? Are current standards suitable for the deployment of flexible energy communities? What, and how, assets (flexible loads, storage systems) can be used to mitigate possible negative impacts?

Keynote 5: Professor Pavol Bauer, Technical University of DELFT, Netherlands
Date : September 29, 2021 10.50-11.50 AM

Biography:

Pavol Bauer is currently a full Professor with the Department of Electrical Sustainable Energy of Delft University of Technology and head of DC Systems, Energy Conversion and Storage group. He received Masters in Electrical Engineering at the Technical University of Kosice ('85), Ph.D. from Delft University of Technology ('95) and title prof. from the president of Czech Republic at the Brno University of Technology (2008) and Delft University of Technology (2016). He is also honorary professor at Politehnica University Timisioira in Romania. From 2002 to 2003 he was working partially at KEMA (DNV GL, Arnhem) on different projects related to power electronics applications in power systems. He published over 100 journal and over 350 conference papers in his field (with H factor Google scholar 48, Web of science 29), he is an author or co-author of 8 books, holds 9 international patents and organized several tutorials at the international conferences. He has worked on many projects for industry concerning wind and wave energy, power electronic applications for power systems such as Smarttrafo; HVDC systems, projects for smart cities such as PV charging of electric vehicles, PV and storage integration, contactless charging; and he participated in several Leonardo da Vinci and H2020 EU projects as project partner (ELINA, INETELE, E-Pragmatic, Smart Charging, Metrology for Inductive Charging, Trolley 2.0. Progressus, P2P) and coordinator (PEMCWebLab.com-Edipe, SustEner, Eranet DCMICRO). He is a Senior Member of the IEEE ('97), former chairman of Benelux IEEE Joint Industry Applications Society, Power Electronics and Power Engineering Society chapter, chairman of the Power Electronics and Motion Control (PEMC) council, member of the Executive Committee of European Power Electronics Association (EPE) and also member of international steering committee at numerous conferences.

DC Systems and Storage: Two Key Technologies for Energy Transition

Summary: DC grids and storage are considered to be two key technologies for the connection, collection and integration of renewable energy resources, for the realization of integrated power systems, for mobile applications (electric ships, aircrafts), for new types of urban and industrial distribution power networks and to bridge and support existing AC systems. Advanced power electronic components, power converters and system protection are enabling DC grids on multiple voltages levels. Especially medium voltage DC grids are expected to play a key role in managing the higher power flows in our future distribution grids. Roadmap for DC and storage, different steps and research at the TUD is presented with focus on DC grids and DC microgrids and storage integration.

TUTORIALS

Tutorial 1: Electric Vehicles - Current Status and Future Trends
Date : September 26, 2021- 10.00-11.00 AM

Organizer: Professor Bulent SARLIOGLU, University of Wisconsin-Madison
Professor Bulent ERTAN, Atilim University, Turkey

Biography: Bulent Sarlioglu is a Jean van Bladel Associate Professor with the University of Wisconsin-Madison and the Associate Director of the Wisconsin Electric Machines and Power Electronics Consortium. From 2000 to 2011, he was with Honeywell International Inc.'s Aerospace Division, Torrance, CA, USA, most recently as a Staff Systems Engineer. Dr. Sarlioglu conceived, prototyped, and developed products that are flying today, including in A350 and A380 aircraft. Dr. Sarlioglu received his Ph.D. degree from the University of Wisconsin-Madison.

His expertise includes electrical machines, drives, and power electronics, with a particular emphasis on electrification of transportation and industrial applications. He is the inventor or co-inventor of 20 U.S. patents and many international patents. In addition, he has more than 200 technical papers that are published in conference proceedings and journals. Dr. Sarlioglu was the recipient of the Honeywell's Outstanding Engineer Award in 2011 for his outstanding contribution to aerospace, the NSF CAREER Award in 2016, and the 4th Grand Nagamori Award from Nagamori Foundation, Japan, in 2018.

Dr. Sarlioglu involves in many IEEE activities. He currently serves as the Chair of PES Motor Subcommittee, Chair of the IAS Transportation Committee, Educational Activity Chair of the PELS TC4 Electrical Transportation Systems, and one of the co-editors of the IEEE Electrification Magazine. Dr. Sarlioglu was the general Chair of ITEC 2018 and Technical Program Co-Chair for ECCE 2019 and a special session chair in ECCE 2020. Dr. Sarlioglu nominated and selected to become a Distinguished Lecturer for both IEEE Vehicle Technology Society (2021-Present) and IEEE Industrial Application Society (2019-Present). Dr. Sarlioglu is the recipient of IEEE PES Cyril Veniott Award in 2021.

Biography: H. Bulent Ertan (M'02) received B.S. and M.S. degrees in Electrical and Electronics Engineering in 1971 and 1973 respectively from the Middle East Technical University (METU) in Ankara, Turkey and a Ph.D. degree from the University of Leeds, the UK in 1977.

He directed many industry-supported projects since 1977. He led the Intelligent Energy Conversion Group at TUBITAK (Turkish Scientific and Technological Research Council) Information Technologies and Electronics Research Institute (BILTEN) in Ankara Turkey, between 1999-2006. He was an executive committee member of the Center for Wind Energy, METU and also director of the Electromechanics laboratory between 2011-2017. Prof. Ertan was chairman of the Mustafa Parlar Education and Research Foundation in 2000 and he was a member of the executive board of this foundation until 2016.

He has published more than 150 journal and conference papers so far. He is co-editor of two books entitled "Modern Electrical Derives", Kluwer Academic Publishers, Netherlands, 2000 (NATO ASI series) and "Transformers: Analysis Design and Measurement" (CRC Press, 2013). Prof. Ertan is the holder of 5 national and international patents. He received the IEE Overseas Premium award in 1993 and an IEEE award in 2014, for his contributions to the IEEE standard "Trial-use guide for testing permanent magnet machines".

Professor Ertan is the founder of the Aegean International Conference on Electrical Machines and Power Electronics (ACEMP). Prof. Ertan is a member of the Turkish Chamber of Electrical Engineers and member of IET (UK) and a senior member of IEEE. He is currently the Mechatronics Engineering Department chair at Atilim University.

Electric Vehicles - Current Status and Future Trends

Summary: Electric vehicles are vital technological advancements to reduce greenhouse gas emissions. In the electric automotive industry, traction drive with high power and higher power density

is necessary for both Hybrid Electric Vehicle (HEV) and Battery Electric Vehicle (BEV) applications. In the case of HEV, industries are moving from micro-HEV to full-HEV due to a higher fuel economy. However, this technical shift calls for increased power from the battery while reducing power from the conventional engine. Plug-in hybrid electric vehicles and Battery Electric vehicles are gaining marketplace, and many companies are introducing new vehicles to the market in an accelerated fashion. The diversity of requirements, performance, price are noteworthy, and competition and growth in this market will be enormous in the near future.

This tutorial aims to cover electric and hybrid vehicles and review the advancement in motors and power electronics. In this tutorial, an introduction will be given to electric vehicles. Current research and literature will be reviewed. Particular emphasis will be provided to achieve higher power density, and various kW/liter metrics will be discussed. The benefits of integrated motor drives will be reviewed. SiC and GaN technology for power converters will be discussed. Current source inverters (CSI) are drawing more attention in improving the overall performance of a motor drive system in terms of increasing the constant power speed ratio (CPSR) and reducing the PWM-induced motor iron losses. Advancements in electric machines for traction drives will be presented.

The second part of the tutorial focuses on the series-hybrid vehicle traction system component sizing. The sensitivity of vehicle performance such as fuel consumption, initial cost, return of investment, to the various choices of traction components is discussed. The relationship between the traction component choice and the vehicle performance is illustrated on an example commercial vehicle.

Tutorial 2: High Power Dual Active Bridges Design, Modeling, and Implementation
Date : September 26, 2021- 11.10-12.10 AM

Organizers: : Professor Nasiri, University of South Carolina (USC), USA

Biography: Prof. Nasiri joined University of South Carolina (USC) in August 2021 after a 16-year career at the University of Wisconsin-Milwaukee (UWM). AT UWM, he served in various positions including Associate Dean for Research, Richard Grigg, Jr. Professor and Director of Center for Sustainable Electrical Energy Systems in the College of Engineering and Applied Sciences at the University of Wisconsin–Milwaukee, site director for the NSF center on Grid-connected Advanced Power Electronic Systems (GRAPES), Interim Executive Director of Connected Systems Institute. Prior to UWM, he worked for ForHealth Technologies, Inc. and Moshanir Power Engineering Company. He has served as a primary investigator on many federal and industry sponsored projects. His research interests are high power/voltage energy conversion, energy storage, and microgrids. Dr. Nasiri has published numerous technical journal and conference papers on related topics. He also holds seven patents and has co-authored two books.

Dr. Nasiri is currently the chair of IEEE Industry Applications Society (IAS) Committee on renewable and sustainable energy conversion and Vice Chair TC5 (sustainable energy systems) at IEEE Power Electronics Society (PELS). He is also an Editor of Power Components and Systems, and Associate Editor of the International Journal of Power Electronics and was an Editor of IEEE Transactions on Smart Grid (2013-2019) and paper review chair for IAS (2018-2019). He was the general Chair of 2012 IEEE Symposium on Sensorless Electric Drives, 2014 International Conference on Renewable Energy Research and Applications (ICRERA 2014), and 2014 IEEE Power Electronics and Machines for Wind and Water Applications (PEMWA 2014).

High Power Dual Active Bridges Design, Modeling, and Implementation

Summary: Dual Active Bridges (DAB) are common power electronics building blocks traditionally used in various electrically isolated converter systems. There is a renewed interest in understanding and developing DABs as core components for Solid State Transformers (SST). These transformers can add flexibility, controllability, and reliability to existing electrical distribution systems. Major elements of a DAB are two H-bridge converters and a high frequency transformer. With the advent of Wide Band Gap (WBP) devices offering higher voltage and power ratings, many initiatives have started to replace the traditional low frequency transformers with compact and controllable SSTs. In this tutorial, first the design and development of high frequency transformers are discussed. Then, several control methods for the DABs including phaseshift, duty ratio, and triple phase shifts are discussed to control the power flow. Methods are discussed to minimize the RMS current, reduce reactive power transfer, and minimize converter loss. Applications of DABs for several SST configurations a are also discussed.

Tutorial 3: Low Frequency Modulation of Modular Multilevel Converters
Date : September 26, 2021- 12.20-13.20 PM

Organizers: Professor Carlo Cecati, DISIM & DigiPower srl Universitá degli studi dell'Aquila, L'Aquila, Italy

Biography: Carlo Cecati (M'90–SM'03–F'06) received the Dr.-Ing. degree in electrotechnical engineering from the University of L'Aquila, L'Aquila, Italy, in 1983. Since then, he has been with the same university where, since 2006, he has been a Professor in converters, electrical machines and drives and from 2005 to 2013 a Rector's Delegate. From 2015 to 2017, he has been a Qianren Talents Professor (1000 Talents Program Distinguished Professor) with Harbin Institute of Technology, Harbin, China. In 2007 he has been the founder and currently he is the CTO of DigiPower, a high-tech "Innovative SME" located in L'Aquila, Italy active in the field of high power electronics. His main current research interests include power electronics for distributed generation, smart grids industry and e-transportation. In these fields, he has authored more than 250 journal and conference papers.

Prof. Cecati has been a "2018 highly cited researcher"(Clarivate Analytics). He has been a co-recipient of the 2012 and of the 2013 Best Paper Award of the IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS, the 2012 Best Paper Award of the IEEE Industrial Electronics Magazine and the 2019 Outstanding Paper Award for the IEEE TRANSACTIONS on Industrial Electronics. Prof. Cecati received the 2017 Antony J. Hornfeck Award from the IEEE Indutrial Electronics Society and has been selected to receive the 2021 Dr.-Ing. Eugene Mittelmann Achievement Award, for 'contributions in the area of industrial electronics'. In 2019 he has been appointed Commander of the Republic of Italy. From 2010 to 2012 he has been a Co-Editor-in-Chief and from 2013 to 2015, he has been the Editor-in-Chief of the IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS.

Low Frequency Modulation of Modular Multilevel Converters

Summary: Multilevel Converters (MLC) are gaining popularity in many areas of energy conversion including Renewable Energy Systems, Distributed Generation, Smart Grids, E-Transportation, Electrical Drives for Industry. They are capable to overcome the voltage limits imposed by the adopted power devices (SCR, IGBT, MOSFET) and reducing voltage and current harmonics content and power losses. Their characteristics depend on their architecture and the adopted modulation algorithm, the latter imposing, step-bystep, the desired switching patterns to output power devices. After a brief resume of the main modulation methods, the speech will focus on Selective Harmonic Modulation algorithms (SHE) operating at the fundamental frequency and capable to eliminate some specific frequencies from the outputs. With conventional SHE methods, a set of switching angles is computed off-line (e.g. using Simulink) and then stored in a look-up table (LUT), that is implemented inside the internal memory of the digital control system. The LUT is scanned in real-time by the digital controller during converter operation, which returns the most appropriate pre-calculated set of conduction intervals/angles. The determination of the switching angles is quite complex and time-consuming and it is often achieved using artificial intelligence methods, which cannot be performed in real-time and require large amounts of memory space, necessary to store the numerous outputs in LUT. A reduction of the number of pre-computer sets of angles brings to the low resolution of commutation angles and poor THD, moreover, it is not flexible with closed-loop operations. Analytical methods, instead, require an exact mathematical problem formulation but brings relatively complex equations, which can be computed in real-time using conventional hardware. They don't need large memory spaces and offer superior selective harmonic elimination capabilities. Analytical approaches can also lead to selective harmonics mitigation, which, although not eliminating any specific harmonic, can bring to better total harmonics distortion. After a theoretical discussion on the fundamentals of modulation algorithms with analytical methods, the speech will introduce and discuss some methods developed for and implemented with cascaded H-Bridge multilevel converters. The ad-hoc modular multilevel converter architecture developed by DigiPower Ltd. will be also discussed before presenting some simulation and experimental results.

Tutorial 4: The Goal of 100% Renewable Energy Sources to Fit the Green Transition: Challenges and Solutions
Date : September 26, 2021- 13.30-14.30 PM

Organizers: Professor Rosario MICELI, University of Palermo, Italy

Biography: Rosario Miceli received the MSc and Ph.D. degree in Electrical Engineering from the University of Palermo, respectively in 1982 and 1987. From 1992 he was Assistant Professor and from 2003 Professor of Electrical Machines at University of Palermo, Italy. He is currently Professor of Electrical Machines, Power Electronics and Systems Automation with the Faculty of Engineering, University of Palermo. He is Personnel-in-Charge of the Sustainable Development and Energy Savings Laboratory of the Palermo Athenaeum. His main research interests include mathematical models of electrical machines, drive-system control, diagnostics, renewable energies, and energy management. He has published more than 150 technical papers, 1 chapter of a book and a book (Energy Management via Connected Household Appliances. vol. 1, p. 1-162, McGraw-Hill, ISBN:978-88-386-6676-6).

Low Frequency Modulation of Modular Multilevel Converters

Summary: It can be stated that the sustainable development of our planet is considerably related to a significant and constant reduction of environmental pollution in the next years. In this perspective, the technological transition of power production from traditional energy sources to 100% renewable energy sources, represents a valuable solution to the global climate change challenge, decreasing Greenhouse Gas (GHG) emissions. Indeed, this is one of the most relevant actual topics of all governments policy and it has considerable attention in the scientific community.

As well known, electrical power systems are changing from centralized generation systems to distributed generation systems due to the increase of renewable energy sources. In the next future, the main grid will be composed by interconnected microgrids that can be managed and controlled independently. In particular, in a power system with conventional power plants, where synchronous machines are adopted, and distributed generation plants, where static conversion systems are used, the system stability is entrusted only on the conventional power generation systems thanks to their rotating inertia and damping. Indeed, static power converters cannot provide inertia and damping to power systems, so they are vulnerable to power dynamics and system faults. Thus, power system stability is degraded as the penetration of renewable energy sources increases and this issue is amplified in a possible future power system with only renewable sources.

The "Smart Inverters" concept represents a promising solution to overcome the operative limits of traditional renewable energy sources. A Smart Inverter is an inverter with the capability to make a proactive and autonomous decision based on local measurements and external data. This new concept allows obtaining an energy source able to perform different functions, in real-time operations, like grid-supporting mode to provide ancillary services or grid-forming mode in the case of islanded microgrid following a fault. Also, innovative energy storage systems and hybrid solutions play an important role in order to ensure a power reserve to increase grid stability.

In this context, the aim of this tutorial is to provide the audience with the actual scenario and the future perspective on the innovative solutions and control strategies in the inverter-based renewable energy sources. Moreover, a detailed overview of the energy storage systems and innovative hybrid solutions will be discussed.

More in detail, the tutorial is structured as follows:

The first part will be focused on the actual technological transition to an electrical system with 100% renewable energy sources in terms of innovations and operative limits of the traditional systems. These innovative paradigms will also address the social impact and government policies.

The second part of the tutorial will examine the new scenarios of the future power system in terms of the interconnected microgrids with particular attention to the stability of the low-inertia systems.

Finally, the tutorial will give particular attention to the Smart Inverters and their features and challenges in terms of functions, performance improvement, and operation mode. An extensive analysis regarding the control strategies based on the Virtual Synchronous Machine concept and multilevel technologies will be provided. Moreover, a part of this tutorial will be focused on storage systems, innovative hybrid solutions, and management strategies.

CONFERENCE PROGRAM SUMMARY

Program Summary of ICRERA 2021, September 26-29, 2021, Istanbul, TURKEY

Sunday, September 26, 2021

10:00-11:00	Tutorial-I (60 Min)
11:00-11:10	Coffee Break
11:10-12:10	Tutorial-II (60 Min)
12:10-13:00	Lunch Break
13:00-14:00	Tutorial-III (60 Min)
14:00-14:10	Coffee Break
14:10-15:10	Tutorial-IV (60 Min)

Monday, September 27, 2021

9:10-9:40	Opening Ceremony (30 Min)			
9:40-10:40	Keynote Speech-I (60 Min)			
10:40-10:50	Coffee Break			
10:50-11:50	Keynote Speech-II (60 Min)			
11:50-13:10	Lunch Break			
		PARALLEL SESSION A	PARALLEL SESSION B	PARALLEL SESSION C
13:10-14:50	P1	Session-1 5 PAPERS (5*20=100 Min)	Session-2 5 PAPERS (5*20=100 Min)	Session-3 5 PAPERS (5*20=100 Min)
	P2			
	P3			
	P4			
	P5			
14:50-15:00	Coffee Break			
15:00-16:40	P6	Session-4 5 PAPERS (5*20=100 Min)	Session-5 5 PAPERS (5*20=100 Min)	Session-6 5 PAPERS (5*20=100 Min)
	P7			
	P8			
	P9			
	P10			
18:30-20:30	Welcome Party			

Tuesday, September 28, 2021

9:40-10:40	Keynote Speech-III (60 Min)			
10:40-10:50	Coffee Break			
10:50-11:50	Keynote Speech-IV (60 Min)			
11:50-13:10	Lunch Break			
		PARALLEL SESSION A	PARALLEL SESSION B	PARALLEL SESSION C
13:10-14:50	P11	Session-7 5 PAPERS (5*20=100 Min)	Session-8 5 PAPERS (5*20=100 Min)	Session-9 5 PAPERS (5*20=100 Min)
	P12			
	P13			
	P14			
	P15			
14:50-15:00	Coffee Break			
15:00-16:40	P16	Session-10 5 PAPERS (5*20=100 Min)	Session-11 5 PAPERS (5*20=100 Min)	Session-12 5 PAPERS (5*20=100 Min)
	P17			
	P18			
	P19			
	P20			
18:30-20:30	Gala Dinner			

Wednesday, September 29, 2021

10:50-11:50	Keynote Speech-V (60 Min)			
11:50-13:10	Lunch Break			
		PARALLEL SESSION A	PARALLEL SESSION B	PARALLEL SESSION C
13:10-14:50	P21	Session-13 5 PAPERS (5*20=100 Min)	Session-14 5 PAPERS (5*20=100 Min)	Session-15 5 PAPERS (5*20=100 Min)
	P22			
	P23			
	P24			
	P25			
14:50-15:00	Coffee Break			
15:00-16:40	P26	Session-16 5 PAPERS (5*20=100 Min)	Session-17 5 PAPERS (5*20=100 Min)	Session-18 5 PAPERS (5*20=100 Min)
	P27			
	P28			
	P29			
	P30			
16:50-17:20	Closing Ceremony			

CONFERENCE PROGRAM - SUNDAY, SEPTEMBER 26, 2021

Date: SEPTEMBER 26, 2021	
10:00-11:00	**Tutorial-I** **Title: Electric Vehicles - Current Status and Future Trends** **Professor Bulent Sarlioglu Associate Director of Wisconsin Power Electronics and Electric Machines Associate Professor, Electrical and Computer Engineering, University of Wisconsin – Madison, USA** **Professor H. Bulent Ertan Professor, Mechatronics Engineering Department, Atilim University, Ankara, Turkey** **Chairs:** **Professor Dr. Seref Sagiroglu - Gazi University, Turkey** **Professor Yusuf Ozturk, San Diego State University, USA**
11:00-11:10	**Coffee Break**
11:10-12:10	**Tutorial-II** **Title:High Power Dual Active Bridges Design, Modeling, and Implementation** **Professor Nasiri, University of South Carolina (USC), USA** **Chairs:** **Professor Dr. Halil Ibrahim Bulbul - Gazi University, Turkey** **Professor Miguel A. Sanz-Bobi, Comillas Pontifical University, Spain**
12:10-13:00	**Lunch Break**
13:00-14:00	**Tutorial-III** **Title: Low Frequency Modulation of Modular Multilevel Converters** **Professor Carlo Cecati, DISIM & DigiPower srl Universitá degli studi dell'Aquila, L'Aquila, Italy** **Chairs:** **Professor Dr. Ramazan Bayindir - Gazi University, Turkey** **Professor Nagi Fahmi, Aston University, UK**
14:00-14:10	**Coffee Break**
14:10-15:10	**Tutorial-IV** **Title: The Goal of 100% Renewable Energy Sources to Fit the Green Transition: Challenges and Solutions** **Professor Rosario MICELI, University of Palermo, Italy** **Chairs:** **Professor Mihai Cernat - Transilvania University, Romania** **Dr. Khaled Ahmed - Strathclyde University, UK**

CONFERENCE PROGRAM - MONDAY, SEPTEMBER 27, 2021

Date: SEPTEMBER 27, 2021	
9:00-9:40	**OPENING CEREMONY:** **-Yoshinobu Higashi, Former Japan Ambassador to Romania, Honorary Chair ICRERA 2021, Japan** **-Mr. Hidehiko Kikuchi, Senior Advisor to TMEIC, Honorary Chair ICRERA 2021, Japan** **-Mr. Yuji Kawagoe, Senior Corporate Advisor to NIHON MECCS Co., Ltd., Japan** **-Professor Senay Yalcin, Rector, Nisantasi University, Turkey** **-Professor Ilhami Colak, General Chair, ICRERA 2021, Turkey** **-Professor Fujio Kurokawa, General Co-Chair, ICRERA 2021, Japan** **-Professor Seref Sagiroglu, General Co-Chair, ICRERA 2021, Turkey** **Chairs: Rosario Micheli, Nobumasa Matsui**
9:40-10:40	**Speaker: Mr. Masayuki TOBITA, Vice President of TMEIC, Japan.** **Title: Contributions to Carbon Neutral through PEiE, Power Electronics in Everything** **Chairs: Brayima Dakyo, Fujio Kurokawa**
10:40-10:50	**Coffee Break**
10:50-11:50	**Speaker: Professor Seamus Garvey, Nottingham University, UK** **Title: Four Distinct Durations of Energy Storage in Systems Powered Largely from Renewables** **Chairs: Khaled Ahmed, Fabio Viola, Abdou Tankari Mahamadou**
11:50-13:10	**Lunch Break**

CONFERENCE PROGRAM - MONDAY, SEPTEMBER 27, 2021

Date: SEPTEMBER 27, 2021			
	PARALLEL SESSION A	**PARALLEL SESSION B**	**PARALLEL SESSION C**
SESSION 1	**CHAIRS:Selim Oncu; Hamza Mohamed Alrajoubi**	**SESSION 2** **CHAIRS: Harrouz Abdelkader; Tadashi Suetsugu**	**SESSION 3** **CHAIRS: Sertac Bayhan; Hiroki Goto**
13:10-13:30	**ID:8 A comparative study of Hidden Layer Neurons and Delay Time for Wind Energy Forecasting Model using NARX** Aisha Sa'ad (Igipm)*; Aime Nyoungue (Igipm); zied hajej (LGIPM)	**ID:109 Uncoordinated Charging Profile of EVs Based on An Actual Charging Session Data** Murat Akil (Aksaray University); Ensar Kilic (Gazi University); Ramazan Bayindir (Gazi University)*; Asker Sebati (Europower Enerji); Ramin Malek (Europower Enerji)	**ID:16 Enhancement of biogas production from anaerobic co-digestion of rice straw and thickened waste activated sludge with hydrodynamic cavitation pretreatment** Hani Ezz (Egypt-Japan university of sciences and technology)*; Manabu Fujii (Tokyo Institute of Technology Tokyo); Mahmoud Nasr (Alexandaria University); Mona. G Ibrahim (Alexandaria University)
13:30-13:50	**ID:2 Solar PV module voltage output and maximum power yearly profile using Simulink-based model** Kelebaone Tsamaase (University of Botswana)*; Japhet Sakala (University of Botswana); Edward Rakgati (BITRI); Ishmael Zibani (University of Botswana); Kagiso Motshidisi (University of Botswana)	**ID:102 Electric Vehicles Charging Management With Monte Carlo Simulation** Asker Sebati (Europower Enerji); Ensar Kilic (Gazi University); Murat Akil (Aksaray University); Ramazan Bayindir (Gazi University)*; Ramin Malek (Europower Enerji)	**ID:18 Optimal Protection Coordination Scheme of Overcurrent Relays for a Power Network Equipped with Renewable Energy** Feras M. Al Asali (The Hashemite University)*; Othman Alsmadi (The University of Jordan); Eyad Zarour (The University of Jordan); Ali Al-Hayajneh (The University of Jordan)
13:50-14:10	**ID:3 The output power smoothing method and its performance analysis of hybrid energy storage system for photovoltaic power plant** Qingquan Lv (State Grid Gansu Electric Power Research Institute); Jianmei Zhang (State Grid Gansu Electric Power Research Institute); Kun Ding (State Grid Linxia Electric Power Supply Company); Zhenzhen Zhang (State Grid Gansu Electric Power Research Institute); Honglu Zhu (North China Electric Power University); Ruyin Hou (North China Electric Power University)*	**ID:10 Optimized integrated maintenance, production and spare parts strategy for a wind turbine system** Abderrahmane Faker (LGIPM)*; Salim BOUSLIKHANE (universiapolis); zied hajej (LGIPM); Sofiene Dellagi (LGIPM)	**ID:19 Class-E Inverter with Frequency Modulation Control** Yutaro Komiyama (Chiba University)*; Wenqi Zhu (Chiba University); Kien Nguyen (Chiba University); Hiroo Sekiya (Chiba University)
14:10-14:30	**ID:108 A Brief Review on Capacity Sizing, Control and Energy Management in Hybrid Renewable Energy Systems** Ayse Colak (University of Strathclyde)*; Dr K Ahmed (Strathclyde)	**ID:12 Power Management of Microgrid Integrated with Electric Vehicles in Residential Parking Station** Hojun Jin (Korea Advanced Institute of Science Technology)*; Sarvar Hussain Nengroo (Korea Advanced Institute of Science Technology); Sangkeum Lee (Electronics and Telecommunications Research Institute); Dongsoo Har (Korea Advanced Institute of Science Technology)	**ID:20 Evaluation of residential up and down-regulation participation for additional flexibility of distribution grid: French case** Jura Arkhangelski (University of Paris Est Creteil, Certes Lab.)*; Abdou Tankari Mahamadou (University of Paris Est Creteil, Certes Lab.); Lefebvre Gilles (University of Paris Est Creteil, Certes Lab.)
14:30-14:50	**ID:7 A New Load Detection Method and Circuit Analysis for Quasi Resonant Inverter** Metin Ozturk (Istanbul Esenyurt Universitesi)*; Fatih Zungor (Yildiz Technical University); Burhaneddin EMRE (Istanbul University - Cerrahpasa); Baris Oz (Mamur Teknoloji Sistemleri)	**ID:13 Multi-level Stacking of Long Short-Term Memory Recurrent Models for Time Series Forecasting of Solar Radiation** Rami A AL-HAJJ (American University of the Middle East)*; Mohamad Fouad (Mansoura University); Ali ASSI (IEEE)	**ID:23 Constant Power Control of Wireless Transfer System Using a Matrix Converter for Changing Coil Distance** Keita Kuriyama (Nagoya Institute of Technology)*; Takaharu Takeshita (Nagoya Institute of Technology)
14:50-15:00	**Coffee Break**	**Coffee Break**	**Coffee Break**
SESSION 4	**CHAIRS:Yudai Furukawa; Jimmy N Wanzala**	**SESSION 5** **CHAIRS: Zied Hajej; Rami A AL-HAJJ**	**SESSION 6** **CHAIRS:Feras M. Al Asali; Hani Ezz**
15:00-15:20	**ID:24 Evaluation of Interoperability Functions via Modbus-TCP for Photovoltaic Inverters** Alperen Colak (TMEIC)*; Yoshihiro Tawada (TMEIC); Ruben Inzunza (TMEIC); Tatsuaki Amboh (TMEIC)	**ID:29 External Rotor 6/8 Switched Reluctance Motor Design for E-Bike** Samet KOYUNCU (Pamukkale University)*; Ugur Tuncer (Hitit University); ADEM DALCALI (BANDIRMA ONYEDI EYLUL UNIVERSITY); Selim ONCU (Karabuk University)	**ID:52 Model Predictive Control for Full Bridge Boost Rectifier with Constant Switching Frequency** OGUZ ALKUL (Texas A&M University at Qatar)*; Sevki DEMIRBAS (Gazi University); Sertac BAYHAN (Gazi University); Haitham Abu-Rub (Texas A&M University)
15:20-15:40	**ID:25 An MPPT Controlled BLDC Motor Driven Water Pumping System** hamza mohamed alrajoubi (karabuk universty)*; Selim ONCU (Karabuk University); sinan Kivrak (Yildirim Beyazit University)	**ID:30 PDM Controlled Resonant Power Converter for Wind Energy Conversion System** Tufan Vokan Kucuk (Bilecik Universitesi)*; Selim ONCU (Karabuk University)	**ID:53 Harmonics Mitigation in DC Based Charging Stations for EVs** Rares C Nacu (Technical University of Cluj Napoca)*; Daniel FODOREAN (Technical University of Cluj Napoca)
15:40-16:00	**ID:26 Open-Circuit Fault detection method for Grid-side Three-level NPC Inverter** Ahmed Al Ameri (University of Le Havre)*; Aimad Alili (University of Le Havre); Mamadou B Camara (University Le Havre); brayima DAKYO (Universit Le Havre)	**ID:31 Design and Simulation of Smart-Grids using OMNeT++/ Matlab-Simulink Co-simulator** Ammar Allaoua (University of Mohamed El Bachir El Ibrahimi Bordj Bou Arreridj-Algeria); Toufik Madani Layadi (university of Bordj Bou Arreridj)*; Ilhami Colak (Nisantasi University)	**ID:54 The Precision SOC Estimation for Fire Prevention of the EES Using ANN** Ga-Eun Jung (Korea Electrotechnology Research Institute)*; JiKook Baek (IES Co. LTD.); Jianyong Liu (IES Co., Ltd.); Van Quan Dao (Changwon National University); MINH-CHAU DINH (Changwon National University); Chang Soon Kim (Changwon National University); Myung-Kwan Lee (Battery Solution Co., Ltd.); Jung-Hyo Bae (Korea Electrotechnology Research Institute)
16:00-16:20	**ID:27 Efficient Energy Management for Wind-Battery Hybrid System Based Variable Frequency Approach** Ahmed Al Ameri (University of Le Havre)*; Camara Mamadou Bailo (University of Le Havre - France); brayima DAKYO (Universit Le Havre)	**ID:32 Organic Rankine Cycle- and Photovoltaic/Thermal-Solar Assisted Heat Pump-Based Micro-Trigeneration Systems: Comparative Performances in Canadian Condition** Wahiba Yaici (Natural Resources Canada/CanmetENERGY)*; Andres Annuk (Estonian University of Life Sciences); Evgueniy Entchev (CanmetENERGY/Natural Resources Canada); Michela Longo (Politecnico di Milano)	**ID:57 Control Strategy for Power Smoothing Converter with Energy Storage for Maximum Power Controlled Wave Energy Convertor** Akihiro Masuda (Utsunomiya University); Hiroki Goto (Utsunomiya University)*
16:20-16:40	**ID:103 Policy Instruments to Promote the Use of Renewable Energy for Residential Heating and Cooling: A Case of Turkey** Bilal Duzgun (Gazi University)*; Ramazan Bayindir (Gazi University); Halil Ibrahim BULBUL (Gazi University)	**ID:63 Numerical Investigation on the Effects of Gas Induction Velocity on the Performance of a Fluidized Bed Reactor** Mariam M Yehia (Egypt-Japan University of Science and Technology (EJUST))*; hamdy hassan (EJUST); Shinici Ookawara (Tokyo Institute of Technology); Mori Shinsuke (Tokyo Institute of Technology); Ahmed Elwardany (Egypt-Japan University of Science and Technology (E-JUST))	**ID:105 Voltage Balance of Multiconnected Half Bridge Converter** Kazuhiro Kajiwara (Nagasaki Institute of Applied Science)*; Ryuya Daimon (Nagasaki Institute of Applied Science); Yuji Ohta (Isahaya Electronics Corporation); Akio Segami (Isahaya Electronics Corporation); Nobumasa Matsui (Nagasaki Institute of Applied Science); Fujio Kurokawa (Nagasaki Institute of Applied Science)
18:30-20:30	**Welcome Party**		

CONFERENCE PROGRAM - TUESDAY, SEPTEMBER 28, 2021

Date: SEPTEMBER 28, 2021	
09:40-10:40	**Speaker: Professor Jun-ichi Itoh, Nagaoka University of Technology, Japan** **Title: Minimization Technologies for Smart Inverter Based on Circuit Topology and Its Control** **Chairs: Mihai Cernat, Mehdi Bagheri**
10:40-10:50	**Coffee Break**
10:50-11:50	**Speaker: Professor Joao Martins, Universidade Nova de Lisboa, Portugal** **Title: Energy Flexibility as the Path Towards Sustainability** **Chairs: V. Fernao Pires, Mariacristina Roscia**
11:50-13:10	**Lunch Break**

CONFERENCE PROGRAM - TUESDAY, SEPTEMBER 28, 2021

Date: SEPTEMBER 28, 2021			
	PARALLEL SESSION A	**PARALLEL SESSION B**	**PARALLEL SESSION C**
SESSION 7	**CHAIRS: Sevki Demirbas; Selami Balci**	**SESSION 8** **CHAIRS: Aissa Oualid; Korhan Kayisli**	**SESSION 9** **CHAIRS:Haitham Abu-Rub; Mehmet Yesilbudak**
13:10-13:30	**ID:34 Production of biogas in a dry anaerobic digestion reactor of residues generated in the processing of sheep and alpaca wool** Maria A. Salamanca - Valdivia (Universidad Catolica de Santa Maria); Giovanna M. Moscoso-Apaza (Instituto de Investigación y Desarrollo para el Sur); Luz Cardenas-Herrera (Universidad Nacional de San Agustin)*; Ruth E. Gárate-de-Dávila (Instituto de Investigación y Desarrollo para el Sur); Jaime E. Barreda-Del-Carpio (Universidad Catolica de Santa Maria); Cesar A. Munive-Talavera (Universidad Catolica de Santa Maria)	**ID:40 A Short-Term Load Demand Forecasting based on the Method of LSTM** Idris BODUR (Gazi Univesity); Emre Celik (Duzce University); Nihat Ozturk (Gazi University)*	**ID:59 Optimal Scheduling Of Hybrid AC-DC Microgrid Using Information Gap Decision Theory** ramin nourollahi (Student of power systems); Kazem Zare (University of Tabriz)*; Behnam Mohammadi-ivatloo (University of Tabriz); Amjad Anvari-Moghaddam (Aalborg University)
13:30-13:50	**ID:35 Construction and evaluation of a dry anaerobic digestion reactor for the degradation of solid waste from the textile industry with the use of fungal keratinolytic strains** Cardenas-Herrera L. (Universidad Nacional de San Agustin)*; Munive-Talavera, C. (Universidad Nacional de San Agustin); Salamanca-Valdivia, M. (Universidad Nacional de San Agustin); Garate-Manrique, R. (Instituto de Investigacion y Desarrollo para el Sur); Moscoso-Apaza, G.(Instituto de Investigacion y Desarrollo para el Sur); Villanueva-Salas, J. (Universidad Nacional de San Agustin)	**ID:41 Independent controlled hot-plug switches for parallel operation of reused battery strings** Kazuo Takehara (NExT-e Solutions Inc.)*; Fumiaki Nakao (NExT-e Solutions Inc.); Kimihiro Nishijima (Sojo University); Eiji Sakai (Sojo University)	**ID:60 Optimization of the Operating Frequency of a Bidirectional Synchronous H6 Inverter** Meshari Alshammari (National University of Ireland Galway)*; Maeve Duffy (National University of Ireland Galway)
13:50-14:10	**ID:46 Design Requirements and Technical Architecture of a Fault- and Restoration-Based Load Forecasting Mechanism for Tanzania Secondary Distribution Electric Power Grid** Hussein Abubakar Bakiri (Institute of Finance Management)*; Libe Valentine Massawe (University of Dar es Saalam, College of Information and Communication); Hellen Maziku (University of Dar es Salaam (UDSM))	**ID:42 Estimating Wind Power Plant Outputs in Transmission System Planning Studies Based on Probability Approaches** Ahmet OVA (Gazi University)*; Sevki Demirbas (Gazi University)	**ID:49 Power Quality Enhancement of AC/DC Converter by a Smart Direct Power Control: Practical Assessment** OUALID AISSA (University of Mohamed El-Bachir El-Ibrahimi, Bordj Bou Arreridj)*; Samir Moulahoum (University of Media); Badreddine Babes (1Research Center in Industrial Technologies CRTI); Ilhami Colak (Nisantasi University)
14:10-14:30	**ID:38 Performance of a Dual-Chamber Microbial Fuel Cell Inoculated with Active Soil Microbes for Bioelectricity Generation and COD Removal of Wastewater** Irene S. Asetre (Partido State University); Lemmuel Tayo (Mapúa University)*	**ID:45 Fraction Open Circuit and Fractional Short Circuit Based Incremental Conductance Maximum Power Point Tracking Controller** Ahmed ALsulami (University of Leeds)*; Salma M S Alarefi (University of Leeds)	**ID:107 Comprehensive Non-Intrusive Load Monitoring Process:Device Event Detection, Device Feature Extraction and Device Identification Using KNN,Random Forest and Decision Tree** Fethi Batincan Gurbuz (Gazi University); Ramazan Bayindir (Gazi University); Seyfettin Vadi (Gazi University)*
14:30-14:50	**ID:39 Tree Bean (Parkia timoriana) Seed Oil: A Potential Raw Material for Biofuel Production** Angelo Panlaqui (Philippine Nuclear Research Institute); Roderick De Luna (Pamantasan ng Lungsod ng Maynila); Lemmuel Tayo (Mapúa University)*	**ID:47 Backstepping Approach Based on Direct Power Control of a DFIG in WECS** Mazouz Farida (univ Batna 2)*; Belkacem Sebti (Batna 2 University); BOUKHALFA GHOULEM ALLAH (UNIVERCITY BATNA 2); Ilhami Colak (Nisantasi University)	**ID:51 Design of a Load Frequency Control based on a Fuzzy logic for Single Area Networks** MOHAMMED Kh. AL-NUSSAIRI (University of Misan)*; Sadeq AL-Majidi (University of Misan); Ahmed Raisan Hussein (University of Misan); Ramazan Bayindir (Gazi University)
14:50-15:00	**Coffee Break**	**Coffee Break**	**Coffee Break**
SESSION 10	**CHAIRS:Lemmuel Tayo; Luz Cardenas Herrera**	**SESSION 11** **CHAIRS:Nihat Ozturk; Mazouz Farida**	**SESSION 12**
15:00-15:20	**ID:64 Power Consumption Characteristics of Appliances in a Smart House powered by Multi-Phase Transformer-based DC Power** Kazuki Ikeda (Aichi Institute of Technology)*; Yuto Iwasaki (Aichi Institute of Technology); Masaki Tsunekawa (Aichi Institute of Technology); Kazuto YUKITA (Aichi Institute of Technology); Toshiro Matsumura (Aichi Institute of Technology); Toshiya Nanahara (Aichi Institute of Technology); Akinori Kato (Kawamura Electric Inc)	**ID:82 Design, Simulation, and Comparison of Wireless Power Transfer Systems with Single and Multiple Resonator Coils for UAVs** Altynay Smagulova (Nazarbayev University); Seyed Saeid Heidari Yazdi (Nazarbayev University)*; Mehdi Bagheri (Nazarbayev University)	
15:20-15:40	**ID:65 Supercapacitor-Based Shuttle Bus Characterization for Urban Charging Infrastructure Design** Nicola Campagna (University of Palermo)*; Vincenzo Castiglia (University of Palermo); Rosario Miceli (University of Palermo); Alessandro Busacca (University of Palermo)	**ID:83 Minimizing Reactive Power of DAB Converters in EPS Control with Evolutionary Computation** Erdem AKBOY (Yildiz Teknik Universitesi)*; Revna ACAR VURAL (Yildiz Teknik Universitesi)	
15:40-16:00	**ID:67 Implementation on NI-SOM sbRIO-9651 and Experimental Validation of Multi-Carrier PWM Techniques for Three-Phase Five Level Cascaded H-Bridge Inverter** Claudio Nevoloso (University of Palermo)*; Giuseppe Schettino (University of Palermo); Rosario Miceli (University of Palermo); Antonino Oscar Di Tommaso (University of Palermo); Fabio Viola (Università di Palermo); Alessandro Busacca (University of Palermo); Gioacchino Scaglione (University of Palermo)	**ID:84 Coreloss Estimation via Long Short-Term Memory Model (LSTM) of Dry-Type Transformer Based on FEA** Seda Kul (Karamanoglu Mehmetbey University); Berat Yildiz (Karamanoglu Mehmetbey University); Bunyamin Tamyurek (Gazi University); Ires Iskender (Cankaya University)	
16:00-16:20	**ID:68 BLE to improve IoT connection in the Smart Home** Mariacristina Roscia ("University of Bergamo, Italy")*; CRISTIAN LAZAROIU (University Politehinica of Bucarest)	**ID:106 Estimation of Gas Emission Values on Highways in Turkey by Machine Learning** Nursac Kurt (Nisantasi University); Oktay Ozturk; Murat BEKEN (Bolu Abant Izzet Baysal University)*	
16:20-16:40	**ID:61 Special Outlook of energy optimization for a bioecological infrastructure** Daniel Icaza (Catholic University of Cuenca, Cuenca, Ecuador)*; Dario Valarezo (Universidad Politécnica Salesiana); Gino Méndez (Universidad Politécnica Salesiana); Arturo Peralta (Universidad Politécnica Salesiana); Jorge Rojas (Universidad Politécnica Salesiana)	**ID:88 A Novel Control Approach of Multi Motor Electric Scooter Drive** Chergui Hicham (Tahri Mohamed Bechar University); Abdelfatah Nasri (Tahri Mohamed Bechar University); Harrouz Abdelkader (Department of Hydrocarbon and Renewable Energy, Laboratory (LEESI), University of Adrar, Algeria); Korhan KAYISLI (Gazi University)*	
18:30-20:30	**Gala Dinner**		

CONFERENCE PROGRAM - WEDNESDAY, SEPTEMBER 29, 2021

Date: SEPTEMBER 29, 2021	
10:50-11:50	Speaker: Professor Pavol Bauer, Technical University of DELFT, Netherlands Title: Storage in the Grid Chairs: Ramazan Bayindir, Wahiba Yaici
11:50-13:10	Lunch Break

CONFERENCE PROGRAM - WEDNESDAY, SEPTEMBER 29, 2021

PARALLEL PRESENTATIONS			
Date: SEPTEMBER 29, 2021			
	PARALLEL SESSION A	PARALLEL SESSION B	PARALLEL SESSION C
SESSION 13	CHAIRS: Jizhe Wang; Gurkan Soykan	SESSION 14 CHAIRS:Mamadou NDIAYE; Necmi Altin	SESSION 15 CHAIRS:Abdelbasset Krama; Murat Akil
13:10-13:30	**ID:69 An Iterative Method for Bifurcation-Free Resonant Inductive Power Transfer System Design** Nicola Campagna (University of Palermo)*; Vincenzo Castiglia (University of Palermo); Rosario Miceli (University of Palermo); Filippo Pellitteri (University of Palermo)	**ID:75 CONTROL STRATEGY OF THE PERMANENT MAGNET STEPPER MOTOR** Harrouz Abdelkader (Department of Hydrocarbon and Renewable Energy, Laboratory (LEESI), University of Adrar, Algeria)*; hachemi Mr glaoui (university of bechar); Ilhami Colak (Nisantasi University); Korhan KAYISLI (Gazi University)	**ID:104 Detecting Snow Layer on Solar Panels using Deep Learning** Oktay Ozturk (Metamorfoz ICT. Inc.)*; Batuhan Hangun (Nisantasi University); Onder Eyecioglu (Bolu Izzet Baysal University)
13:30-13:50	**ID:70 The Comparing of Linear Damping Methods for Constant Power Loads and Stability Analysis** Ferhat Bodur (Gazi Universty); Orhan KAPLAN (Gazi University)*; Nihat Ozturk (Gazi University)	**ID:77 Importance of Lithium-Ion Energy Storage Systems in Balancing the Grid: Case Study in Turkey** Yusra M Mendi (Enerjisa Enerji)*; Mehmet Demirtas ("Faculty of Technology, Gazi University"); Hulya Akinc (Enerjisa)	**ID:14 Increasing Renewable Energy Penetration and Efficient Utilization Through a Virtual Inductive Impedance Loop-based Droop Control** Daniel O Williams (Egypt-Japan University of Science and Technology)*; Tamer F. Megahed (Mansoura University); Sobhy M. Abdelkader (Mansoura University)
13:50-14:10	**ID:71 A Basic Study on Electricity Demand for Energy Management** Yuto Iwasaki (Aichi Institute of Technology)*; Kazuto YUKITA (Aichi Institute of Technology); Kazuki Ikeda (Aichi Institute of Technology)	**ID:78 Battery Integrated Off-grid DC Fast Charging: Optimised System Design Case for California** Burak Elibol (Baskent Elektrik Dagitim A.S.)*; Bahadır Can Çalışkan (Baskent Elektrik Dagitim A.S.); Çiğdem Armağan (Baskent Elektrik Dagitim A.S.); Gokturk Poyrazoglu (Ozyegin University); Hatice Kaya (Baskent Elektrik Dagitim A.S.); Hülya Erdener Akınç (Baskent Elektrik Dagitim A.S.)	**ID:9 Economic Feasibility, Design, and Simulation of PV System-Based Residential Distribution Grid: REBIANA Village Case Study** Saleh Adam (University of Plymouth); David Jenkins (University of Plymouth); Ahmed Suhail (University of Plymouth); Zakariya Rajab (University of Benghazi); Abedeladim Moftah (College of Science and Technology Qaminis)
14:10-14:30	**ID:72 An application of PDM Technique for MPPT in Solar Powered Wireless Power Transfer Systems** Gungor Bal (Gazi University); Selim ONCU (Karabuk University); Nihat Ozturk (Gazi University); Kenan UNAL (Gazi University)*	**ID:80 Experimental validation of the sliding mode controller to improve the efficiency of the MPPT solar system** Abdelhakim Belkaid (Bordj Bou Arreridj University)*; Seddik BENHADOUGA (Bordj Bou Arreridj University); Ilhami Colak (Nisantasi University); Mounir Meddad (Bordj Bou Arreridj University); Adil Eddiai (Casablanca University)	**ID:50 Integration cost of variable renewable resources to power systems – a techno-economic assessment in European countries** Antoine Monterrat (TotalEnergies)*; Samantha Hilliard (TotalEnergies); Carlos Carrejo (TotalEnergies); Fabrice Devaux (TotalEnergies)
14:30-14:50	**ID:74 A 3.3 V Output Voltage Optical Plasmonic Solar Energy Harvester** Patrizia Livreri (University of Palermo)*	**ID:81 A Vectorial Voltage Modulator for a Dual Inverter with a Floating Bridge to Operate in Normal and Fault Tolerant Mode** V. Fernao Pires (ESTSetubal/IPS)*; Daniel Foito (ESTSetubal - IPS); Armando Cordeiro (ISEL); José Silva (INESC-ID, IST, Universidade de Lisboa)	
14:50-15:00	Coffee Break	Coffee Break	Coffee Break
SESSION 16	CHAIRS:Patrizia Livreri; Orhan Kaplan	SESSION 17 CHAIRS: Vitor Pires; Mehmet Demirtas	SESSION 18 CHAIRS:
15:00-15:20	**ID:92 Design Process of Optimal Dead-time for SiC MOSFET-Based Three-Phase Six-Switch Rectifier** Jizhe Wang (Nagasaki Institute of Applied Science)*; Sho Tezuka (Isahaya Electronics Corporation); Kazuhiro Kajiwara (Nagasaki Institute of Applied Science); Akio Segami (Isahaya Electronics Corporation); Nobumasa Matsui (Nagasaki Institute of Applied Science); Fujio Kurokawa (Nagasaki Institute of Applied Science)	**ID:97 Power Supply Vehicle Hybrid Biomass-PV FPSEG Generator System as a Countermeasure Against Disaster** Mamadou NDIAYE (Shibaura Institute of technology)*; Hiroshi Takami (Shibaura Institute of technology); Yue Liu (Shibaura Institute of technology)	
15:20-15:40	**ID:93 Automatic and Self Adaptive P&O MPPT Based PID Controller and PSO Algorithm** Abdelhakim Belkaid (Bordj Bou Arreridj University)*; Celia Aoughlis (Bejaia University); Ilhami Colak (Nisantasi University); Ouahib GUENOUNOU (University of Bejaia); Mohand Akli. Kacimi (Bejaia University)	**ID:99 A Review of Microgrid Control Strategies** Necmi ALTIN (Gazi University)*; Suleyman Emre Eyimaya (Gazi University)	
15:40-16:00	**ID:94 Locational Marginal Electricity Price Forecasting-Based Self-Attention Mechanism and Simulated Annealing Optimizer using Big Data** Mohamed Sadok Massaoudi (TAMUQ)*; Haitham Abu-Rub (Texas A&M University); Shady Khalil (Texas A&M University at Qatar); tingwen huang (TAMUQ)	**ID:100 Power Factor and Reactive Power in US Residences - Survey and EnergyPlus Modeling** Hope Anderson (University of Kentucky); Abdullah Hadi (University of Kentucky); Evan S. Jones (University of Kentucky)*; Dan M. Ionel (University of Kentucky)	
16:00-16:20	**ID:90 The effect of the use of bio-waste on the generation of electrical energy in municipal solid waste incineration** Husniye Bilen (Bahcesehir University); Ethem Canakoglu (Bahcesehir University); Gurkan Soykan (Bahcesehir University)*	**ID:95 A Systematic Data-driven Analysis of Electric Vehicle Electricity Consumption with Wind Power Integration** Murat Akil (Aksaray University)*; Emrah Dokur (Bilecik S.E. University); Ramazan Bayindir (Gazi University)	
16:20-16:40	**ID:91 Efficient Parameter Estimation of Double Diode-Based PV Cell Model Using Marine Predators Algorithm** Mehmet Yesilbudak (Nevsehir Haci Bektas Veli University)*, Medine Colak (Gazi University)	**ID:96 A Robust Grid-Tied PV System based Super Twisting Integral Sliding Mode Control** Mohamed Ali (Texas A&M University at Qatar); Abdelbasset Krama (Texas A&M University at Qatar)*; Shady Khalil (Texas A&M University at Qatar)	
16:40-17:00			
17:00-17:20	CLOSING CEREMONY		

Presentation Instruction for ICRERA 2021 Presenters

Virtual presentation

Presentation time is 20 minutes including 5 minutes Question/Discussion.