IEEE MELECON 2022

PALERMO, ITALY / JUNE 14-16, 2022

IEEE MEDITERRANEAN ELECTROTECHNICAL CONFERENCE

CONFERENCE PROGRAM

For further information, visit the website
www.melecon2022.org

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Welcome Message from the General Chairs

On behalf of the IEEE Mediterranean Electrotechnical Conference (MELECON), the IEEE Italy Section and the IEEE Region 8, it is our great pleasure to warmly welcome all of you to the 21th Edition of MELECON that is taking place in Palermo, Italy, from Tuesday June 14th to Thursday June 16th, 2022.

IEEE MELECON 2022 is a major international forum presenting design methodologies, techniques and experimental results in emerging electro-technologies. It brings together researchers and practitioners from different fields of Electrical Engineering and it is one of the flagship conferences of the IEEE Region 8, the largest region of IEEE including Europe, Africa and Middle East.

Undoubtedly, innovation in electrical, electronic, and information science and engineering has fundamentally transformed our society in recent decades and the pace of change can only be described as disruptive. Not only technologies, but also economies and societies are continually shaped by innovation. Based on these evidences, the core purpose of MELECON is to foster technological innovation and excellence in the fields of electrical, electronic, information science and engineering.

Specifically, the main purposes of the event are:

- to discuss ideas and to promote cooperation between researchers working in different research areas;
- to disseminate recent advancements, discoveries and applications;
- to promote discussion between the research community and government bodies about effective and successful research policies;
- to increase the public's understanding and awareness of how engineering and technology can positively affect quality of life;
- to promote and to strengthen partnerships and cooperation between academia and industry.

MELECON program is highly varied including plenary sessions, regular technical sessions, special sessions, panels, tutorials, and special events devoted to students and young professionals, Women in Engineering, entrepreneurs and industries.

A special hybrid format has been designed to allow having remote attendance of anybody that could not travel due to COVID-19 restrictions or to visa problems.

About 250 delegates are going to attend the event in presence and more than 60 will join remotely. We are confident that the attendees will have fruitful time with prospective colleagues by presenting their latest on-going research achievements, sharing ideas, thoughts and visions with the goal of shaping a better future for the benefit of humanity.

In addition to the stimulating program of the conference, Palermo, Italian Capital of Culture 2018, with its tourist attractions, the quality of its cuisine, and historical monuments, is an unforgettable place. We hope all the attendees can get a chance to visit this beautiful city.

This year we have the Technical sponsorship of the IEEE Industry Application Society, the IEEE Engineering in Medicine and Biology Society, and 8 Chapters and the financial patronage of ABB and the European Interconnection for Research Innovation and Entrepreneurship, (EIRIE), an EU funded group composed of research & innovation stakeholders active in the fields of smart grids, storage and local energy systems.

The Award Ceremony will take place during the gala dinner and the closing session with the announcement of the winners of the various competitions and of the best paper award.

Whichever is the way chosen to attend the conference, we sincerely hope all attendees have a stimulating time while sharing research findings with colleagues as well as exchanging and discussing new ideas. We wish all enjoy the 2022 IEEE Mediterranean Electrotechnical Conference.

<div align="right">

Guido Ala
Sergio Rapuano
Tiziana Tambosso

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Technical Program Committee Chairs' Welcome Letter

It is a great pleasure to present the program of Melecon 2022 and to welcome you all to Palermo, in what we are sure will be an exciting environment to develop the themes proposed in this 2022 edition. To ensure that no one will miss out on this important event, virtual participation has been also arranged.

The 21st IEEE Mediterranean Electrotechnical Conference features a very rich program developed in four main tracks covering the topics related to energy, industry, healthcare, and digital communities. These themes have been developed across 37 technical sessions, 1 plenary speech and 6 keynotes, 15 invited talks, 7 tutorials. 224 contributed papers, whose authors come from 49 countries, have been accepted for presentation and will be published in the conference proceedings and submitted for publication on IEEE Xplore.

We are also delighted to have two panels hosting the special meeting on innovative start-ups & entrepreneurs, an event organized by the IEEE Women in Engineering Italian Affinity Group (WIE) on "The Vision of the Industry on Digital Evolution in Her Words", a workshop organized by the PANTERA EU project and EERA JP, and a special meeting with industries. In addition to this, the program includes a R8 Student Paper Contest session, a WIE/young student project competition, a student & young professional projects competition, and a Startup Video competition.

Such a rich program is only made possible thanks to the effort of many people to whom we would like to express our sincere gratitude. We would like to thank all the reviewers who have delivered quality reviews within demanding timescales. Special thanks are extended to our colleagues who will provide their valuable expertise during the conference by leading tutorials and chairing tutorial and technical sessions. Finally, we would like to thank all the authors who submitted their papers to Melecon 2022 and all the attendees coming from around the world, both in-person and online.

We hope that you will enjoy this edition's technical program, and we look forward to sharing this experience with you.

Gianfranco Chicco and Daniela Proto

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IEEE MELECON 2022 Plenary Speaker

Plenary Session - Tuesday, June 14, 2022 - H 15:30 CEST

The New Normal: The importance and the role of innovation

Alberto Sangiovanni-Vincentelli
University of California, Berkeley, USA

ABSTRACT

The Covid-19 pandemic advanced the digital transformation by at least 10-15 years, bringing chaos to many productive sectors including tourism, mobility, trade, the hotel and food industries. The speech will analyze the impact of Covid-19 on the whole society and show how innovation can help rethinking business models and the boundaries between industries.

SPEAKER BIO

Alberto L. Sangiovanni-Vincentelli is the Edgar L. and Harold H. Buttner Chair at the EECS Department, UC Berkeley. He graduated from the Politecnico di Milano in 1971. He co-founded Cadence and Synopsys, the two leading EDA companies. He is on the Board of Directors of Cadence, KPIT, Expert.ai, Cy4Gate, Exein, and Chairman of the Board of Quantum Motion, Phononic Vibes, Innatera and Phoelex. He is a member of the advisory board of Walden International and Xseed, of the Scientific Advisory Board of the Italian Institute of Technology and the Chair of the Strategic Board and of the International Advisory Board for the Milano Innovation District. He is a member of the Advisory Board of the Politecnico di Milano and honorary Professor at Politecnico di Torino. He was the President of the "Comitato Nazionale dei Garanti della Ricerca" and of the Strategy Committee of Fondo Strategico Italiano. He consulted for companies such as Intel, HP, Bell Labs, IBM, Lendlease, Samsung, UTC, Lutron, Kawasaki Steel, Fujitsu, Telecom Italia, Pirelli, GM, BMW, Mercedes, Magneti Marelli, and ST Microelectronics. He authored 19 books, 2 patents and over 1,000 papers. He is Fellow of the IEEE and ACM, and a member of the National Academy of Engineering. He earned the IEEE/RSE Maxwell Award "for groundbreaking contributions that have had an exceptional impact on the development of electronics and electrical engineering or related fields", the Kaufmann Award for foundational contributions to EDA, the EDAA lifetime Achievement Award, the IEEE/ACM R. Newton Impact Award, the University of California Distinguished Teaching Award, the IEEE TC-CPS Technical Achievement Award, the IEEE Leon Kirchmayer Graduate Teaching Award and the ISPD lifetime achievement award.

IEEE MELECON 2022 Keynote Speakers

Keynote Track 1 - Smart Energy

Session S1J: Cyber Security and Big Data Issues for Smart Grid Systems
June 16, 2022 - 10:00 CEST

Big Data Analytics, Security and Privacy Issues in Smart Energy Systems

Seref Sagiroglu
Gazi University, Turkey

ABSTRACT

Big data has great potential to provide opportunities not only many fields but also energy enhancing technical, organizational, social and economic gains and contributions. The current potential of applying big data approaches for better planning, managing, designing, and securing power grid operations are very challenging tasks and needs significant efforts. This talk will cover the issues of computational complexity, data security and privacy, cost, management, planning and integration of big data into energy and power grid systems and also focus on the key challenges in big data analytics, privacy and security issues.

SPEAKER BIO

Prof. Dr. Seref Sagiroglu completed his undergraduate education in 1987 at Erciyes University, Department of Electronics Engineering. He completed his doctoral studies at the University of Wales College of Cardiff (now Cardiff University, UK) in 1994. He continues his academic career as the full professor in Software Engineering at Gazi University Computer Engineering Department. Sagiroglu has an outstanding academic with more than 8000 citation; almost 400 articles published in SCI/SSCI indexed journals, national and international conferences, symposium and workshops.

Prof. Sagiroglu:

- is author and/or editor of more than 20 books, owns 4 patents and has completed national and international projects on security, big data, intelligent modeling and control, biometric, etc.
- organised more than 50 national and international events on artificial intelligence, 5G, Big Data, Machine Learning, Deep Learning, Information and Cyber Security, Privacy, IPv6, etc. as a chairman or co-chairman. Some of them are: International Conference on Information Security and Cryptology (www.iscturkey.org); IEEE International Conference on Computer Science and Engineering (www.ubmk.org); IEEE Big Data, Deep Learning and Fighting Cyber Terrorisms (www.ibigdelft.org); IEEE International Conference on Machine Learning and Applications

- also has been founding members of Information Security Association (www.bilgiguvenligi.org.tr); Member of IEEE Biometric Task Force; Turkish Science Research Foundation (www.tubav.org.tr), and The Foundation of the People Caring for the Future (www.gonder.org.tr). Sagiroglu had such duties as President and Executive Committee Members of those NGOs.
- completed the duties as the Deans of Graduation School of Science and Technology and Engineering Faculty, and Head of Computer Engineering Department at Gazi University; Editors of International Journal of Information Security Science (www.ijiss.org); International Journal of Information Security Engineering (in Turkish) (www.dergipark.gov.tr/ubgmd) and CyberMag (www.cybermag.com); General Director of FutureTech (www.futuretech.com.tr); Member of Cyber Security Group of Higher Education Council of Turkey.
- contributed to consultants to Havelsan; IT Regulatory Body of Turkey (BTK) and Personal Data Protection Regulatory Body of Turkey (KVKK).
- has delivered as invited or keynote speakers more than 500 seminars, talks, conferences at universities, schools, sectors, TV and Radio Programs, institutions and organisations in the topics of Information Security, Big and Open Data, Cyber Security and Defense, Artificial Intelligence, Computer and Software Engineering, Privacy, Biometrics, Innovation Culture Creation, IPv6, 5G, etc.
- now is the director of AI and Big Data Center of Gazi University, Ankara Turkey.

Session S1B: Conversion and Control of Sustainable Energy Sources
June 15, 2022 - 14:30 CEST

New Challenges for Power Electronics Converters to Reach Filter Less Operation

Kamal Al-Haddad
University of Montreal, Canada

ABSTRACT

For the last several years, researchers have been working on developing remedial power electronics devices and control strategies to reduce the negative impact and mitigate the power quality of the massive integration of power electronics devices on the electric network. New topologies of multilevel type of power electronics converters appeared as to contribute to soften the massive usage of power converters. Many research efforts in this direction is taking place around the world . The presentation will focus on latest development of new technologies while highlighting the challenges facing the growth of interconnecting electric vehicles, drives and renewable sources through power electronics converters to the grid. Moreover, the latest development on the reduction or elimination of passive and uncontrolled components still called filters that are used to deviate current and voltage harmonics paths from reaching the loads as well as the utility network.

SPEAKER BIO

Kamal Al-Haddad received the B.Sc.A. and M.Sc.A. degrees from the University of Québec à Trois-Rivières, Canada, respectively, and the Ph.D. degree from the Institute National Polytechnique, Toulouse, France, in 1988. Since June 1990, he has been a professor with the Electrical Engineering Department, École de Technologie Supérieure (ETS), Montreal, QC, where he has been the holder of the senior Canada Research Chair in Electric Energy Conversion and Power Electronics since 2002. He has supervised more than 180 Ph.D. and M.Sc. students working in the field of power electronics. He is a consultant and has established very solid link with many Canadian industries working in the field of power electronics, electric transportation, aeronautics, and telecommunications. He has coauthored more than 750 transactions and conference papers. Prof Al-Haddad transferred 25 technologies to the industry. His fields of interest are in highly efficient static power converters, harmonics and reactive power control using hybrid filters, and multilevel converters including the modeling, intelligent control, and development of prototypes for various industrial applications in electric traction, renewable energy, power supplies for drives, electrification and transportation, etc.
Prof. Al-Haddad is a fellow member of the Canadian Academy of Engineering. He is IEEE IES President 2016-2017, IEEE Division VI director elect, associate editor of the Transactions on Industrial Informatics, IES Distinguished Lecturer, and recipient of the IEEE Dr.-Ing. Eugene Mittelmann Achievement Award.
Prof. Al-Haddad is a member of the Academy of Sciences and fellow of the Royal Society of Canada.

Session S2A: Artificial Intelligence, Augmented and Virtual Reality
June 15, 2022 - 09:45 CEST

Robotics for human-human collaboration and sensorimotor augmentation Systems

Domenico Formica
Università Campus Bio-medico di Roma, Italy

ABSTRACT

The era of the fourth industrial revolution brings together robotics, digital mobile devices and services, wearable sensors and IoT systems, building a highly interconnected ecosystem often intimately coupled with human beings and their body. These integrated systems are nowadays essential to foster cutting edge research in a wide variety of fields, from basic science research, to medical and industrial applications, to consumers technologies. Based on these considerations, this talk will present how robotics and wearable technologies can be used to investigate basic mechanisms of motor neuroscience, to objectively assess brain pathologies, and to provide new tools to help people in everyday life. In particular, it will deeply discuss some frontier research topics in human robotics, introducing physically interacting robots connecting humans to facilitate the learning of complex sensorimotor tasks, and supernumerary robotic limbs for sensorimotor augmentation.

SPEAKER BIO

Domenico Formica received the B.S., M.S. and Ph.D. degrees in biomedical engineering from the Università Campus Bio-Medico di Roma, Italy, in 2002, 2004, and 2008 respectively. Since 2011, he has been working as faculty staff at the Università Campus Bio-medico di Roma, where he currently is Associate Professor in Industrial Bioengineering. In 2007 he was visiting student at the Department of Mechanical Engineering of the Massachusetts Institute of Technology, and from 2014 to 2018 he has been visiting scientist at the Nanyang Technological University of Singapore. In 2016 he co-founded the NEXT: Neurophysiology and Neuroengineering of Human-Technology Interaction research unit, a multidisciplinary research group with focus on the study of motor neuroscience in both healthy subjects and neurological patients. He is appointed as Professor of Bioengineering at Newcastle University, starting in March 2022. His research interests lie at the intersection of robotics/mechatronics and neuroscience, and include the areas of mechatronic technologies for studying human motor control, quantitative assessment of patients with neuromuscular disorders, and novel robotic devices to improve motor learning. On these topics he published more than 130 peer-reviewed scientific papers on international journals and conference proceedings. He actively contributed to several important

National and EU-funded projects, and in particular he has been awarded of two national grants for young researcher: the "FIRB – Futuro in Ricerca" early career grant for researchers under 32, by the Italian Ministry of Education, University and Research, and the "Ricerca Finalizzata / Giovani ricercatori" early career grant for researchers under 40, by the Italian Ministry of Health. Currently, he is the European Coordinator of the EU project CONBOTS and PI of the EU project NIMA.

Session S3E: Big Data Integration and Personalised Medicine
June 16, 2022 - 11:00 CEST

Virtual coaching emerges - Developments and advances on persuasive coaching

Dimitrios I Fotiadis
University of Ioannina, Greece

ABSTRACT

Rehabilitation is one of the main phases towards medicating balance disorders. However, for all rehabilitation sessions, it is not feasible and / or economically affordable to provide patients in-hospital sessions with dedicated clinician. Accordingly, existing physiotherapy health services worldwide are centralized in a hospital or clinic with physicians under direct supervision, followed by rehabilitation sessions according to which patients do a series of controlled activities in their own homes. Nowadays, technological developments on sensing devices, edge computing and communication protocols have facilitated the collection of reliable data related to the state of a patient, like motion, ECG and other biosignals. Based on these data, AI solutions have been proposed with the capacity to infer the performance of a patient during a home-based rehabilitation program. Based on this evaluation, smart agents monitor the long term progress of the patient and automatically re-design the management policy, in terms of rehabilitation program design and dosage. These closed-loop persuasive systems, which are usually complemented with virtual or holographic technology, provide also to the significant others (e.g. clinicians, physiotherapists) a monitor and communication channel with the patient, enabling the in-time red-flagging.

SPEAKER BIO

Prof. Dimitrios I. Fotiadis, received the Diploma degree in chemical engineering from the National Technical University of Athens, Athens, Greece, and the Ph.D. degree in chemical engineering and materials science from the University of Minnesota, Minneapolis. He is currently a Professor of Biomedical Engineering in the Department of Materials Science and Engineering, University of Ioannina, Ioannina, Greece, where he is also the Director of the Unit of Medical Technology and Intelligent Information Systems, and is also an Affiliated Member of Foundation for Research and Technology Hellas, Institute of Molecular Biology and Biotechnology, Dept. of Biomedical Research. He was a Visiting Researcher at the RWTH, Aachen, Germany, and the Massachusetts Institute of Technology, Boston. He has coordinated and participated in more than 250 R&D funded projects (in FP6, FP7, H2020, and national Projects), being the coordinator (e.g. INSILC, TAXINOMISIS, HOLOBALANCE, CARDIOCARE,

DECODE, etc.) and Technical coordinator (e.g. SMARTOOL, KARDIATOOL, TO_AITION, etc.). He is the author or coauthor of more than 300 papers in scientific journals, 500 papers in peer-reviewed conference proceedings, and more than 50 chapters in books. He is also the author/editor of 30 books. His work has received more than 19,000 citations (h-index=68). He is IEEE EMBS Fellow, EAMBES Fellow, Fellow of IAMBE, member of the IEEE Technical Committee of information Technology in Healthcare, Editor in Chief of IEEE Journal of Biomedical and Health Informatics, Member of the Editorial Board in IEEE Reviews in Biomedical Engineering, Associate Editor for IEEE Open Journal in Engineering in Biology and Medicine and Computers in Biology and Medicine. His research interests include multiscale modelling of human tissues and organs, intelligent wearable/implantable devices for automated diagnosis, processing of big medical data, machine learning, sensor informatics, image informatics, and bioinformatics. He is the recipient of many scientific awards including the one by the Academy of Athens. He is the co-founder of PDNeurotechnology Ltd, UK.

Session S4A: 3D Networks
June 15, 2022 - 09:30 CEST

Reconfigurable Intelligent Surfaces for Wireless Communications

Marco Di Renzo
CNRS & Paris-Saclay University

ABSTRACT

A Reconfigurable Intelligent Surface (RIS) is a planar structure that is engineered to have properties that enable the dynamic control of the electromagnetic waves. In wireless communications and networks, RISs are an emerging technology for realizing programmable and reconfigurable wireless propagation environments through nearly passive and tunable signal transformations. RIS-assisted programmable wireless environments are a multidisciplinary research endeavor. This presentation is aimed to report the latest research advances on modeling, analyzing, and optimizing RISs for wireless communications with focus on electromagnetically consistent models, analytical frameworks, and optimization algorithms.

SPEAKER BIO

Marco Di Renzo is a Research Director (Professor) with the French National Center for Scientific Research (CNRS), in the Laboratory of Signals and Systems (L2S) of CentraleSupelec – Paris-Saclay University, Paris, France. In Paris-Saclay University, he serves as the Coordinator of the Communications and Networks Research Division of the Laboratory of Excellence on Digital Sciences, and as a Member of the Admission and Evaluation Committee of the Ph.D. School on Information and Communication Technologies. He is the Editor-in-Chief of IEEE Communications Letters and a Distinguished Speaker of the IEEE Vehicular Technology Society. He is a Fellow of the UK Institution of Engineering and Technology (IET), a Fellow of the USA Institute of Electrical and Electronics Engineers (IEEE), an Ordinary Member of the European Academy of Sciences and Arts (EASA), an Ordinary Member of the Academia Europaea (AE), and a Highly Cited Researcher. Also, he is the Vice-Chair of the Industry Specification Group on Reconfigurable Intelligent Surfaces – European Telecommunications Standards Institute.

Towards Automated Visual Inspection of Civil Engineering Structures

Mattia Rigotti
IBM Research Zurich

ABSTRACT

The maintenance of public infrastructure is essential to avoid faster deterioration of assets and shortening of their lifetime. One of the main challenges is however the rising cost associated with physical inspections and continued maintenance. Indeed, roughly 50 billion dollars and two billion civil-engineering labor hours are spent globally each year monitoring bridges for defects.

Increasing the efficiency of monitoring strategies, risk assessment and intervention prioritization without any compromise on safety and regulations could therefore have a considerable impact in revolutionizing infrastructure maintenance.

In this talk I will present some of the progress that IBM Research has been driving in realizing this vision by combining Drone and AI technologies to accelerate inspection of large civil infrastructures. Our technical solution consists of 4 key components, namely: (1) a drone platform for creation of automatic and repeatable navigation paths aimed for high quality image and data capturing (2) 2D rendering of large elements (pillars, towers) by automated stitching of drone captured images, enabling global localization and disambiguation of defects (3) advanced deep learning methods for detecting tiny defects on high-resolution images with high recall, and (4) automated measurement and extraction of defect properties for further analysis by civil engineers. The combination of these components allows to massively accelerate the time of inspection, while making the process scalable and repeatable, and has been demonstrated on one of the longest suspended bridges in the located in Denmark.

SPEAKER BIO

Mattia Rigotti received a Master's degree in Theoretical Physics from ETH Zürich and a PhD in Computational Neuroscience from Columbia University. In 2014 he joined IBM as a research scientist at the IBM Thomas J. Watson Research Center in Yorktown Heights, NY, where he worked on research projects at the interface between machine learning and computational neuroscience, including Reinforcement Learning and the implementation of neural networks training algorithms on energy-efficient neuromorphic hardware.

Recently, Mattia joined the AI automation team in the IBM Zürich Research Lab, where he shifted his research focus on developing data-efficient machine learning, applying deep learning to computer vision for infrastructure monitoring and visual inspection, designing trustworthy and explainable deep learning models, and other research topics motivated by the desire to make machine learning models easier and safer to deploy in large-scale real-world scenarios where they can drive positive societal impact.

IEEE MELECON 2022 Tutorials

Tutorial Track 1 - Smart Energy

Tutorial Session 1.1
June 14, 2022 - 09:00 CEST

Challenges and Solutions for the Green Transition

Rosario Miceli
University of Palermo, Italy

ABSTRACT

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 gridsupporting 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.

SPEAKER BIO

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).

Tutorial Session 1.2
June 14, 2022 - 11:30 CEST

Resilience in low-carbon grids

Pierluigi Mancarella

The University of Melbourne, Australia
The University of Manchester, UK

ABSTRACT

Our understanding of the classical reliability concepts of security and adequacy is increasingly being challenged by the rising penetration level of variable renewable energy (VRE) sources and distributed energy resources (DER) and the more frequent occurrence of extreme, high-impact low-probability (HILP) events – for instance driven by climate change – with potentially catastrophic impacts.

In this tutorial, we will discuss how there is a need for introducing new analysis and modelling frameworks to deal with the increasing fragility of low-carbon grids and exposure to climate change-driven extreme events. The key desirable features of such frameworks will be presented for both operation and planning and from both technical and economic/commercial perspectives, along with metrics, methodologies and modelling tools that can help make future systems more secure, reliable and resilient. Several conceptual, modelling and analytical challenges, approaches and solutions will be outlined.

The key question that will be addressed is whether power and energy systems should be made "stronger" (e.g., through component hardening), "bigger" (more redundant, through investment in new transmission/generation asset) or "smarter" (through new smart grid technologies and operational and commercial practices).

Besides different examples taken from the lecturer's several international projects in the area, the South Australia "Black System" event of September 2016, the UK demand disconnection event of August 2019, and the Texas power crisis of February 2021, will be taken as "textbook" case studies to practically illustrate some of the general concepts presented.

SPEAKER BIO

Pierluigi Mancarella is Chair Professor of Electrical Power Systems at the University of Melbourne, Australia, and part-time Professor of Smart Energy Systems at the University of Manchester, UK.

Pierluigi obtained the PhD degree in Electrical Energy Systems from the Politecnico di Torino, Italy, was a Research Associate at Imperial College London, UK, and held visiting research positions at Sintef/NTNU in Norway and NREL in Colorado, as well as visiting professorships at Ecole Centrale de Lille in France, the Universidad de Chile, and Tsinghua University in China.

In the last 15 years Pierluigi has been involved in/led some 70 research projects and consultancy and professional activities in the UK, Europe, Australia, and internationally, in the areas of multi-energy

systems, grid integration of renewables, reliability and resilience of low-carbon networks, and energy infrastructure planning under uncertainty.

Pierluigi is author of several books and book chapters and over 300 research papers. Among his various activities, he is an Editor of the IEEE Transactions on Smart Grid, the IEEE Transactions on Power Systems, and the brand-new Oxford Open Energy; an IEEE Power and Energy Society Distinguished Lecturer; the past Chair of the Energy Working Group of the IEEE European Public Policy Initiative; the Convenor of the Cigre Working Group C6/C2.34 "Flexibility provision from distributed energy resources"; the lead of the "Regulatory Framework" Task of the Cigre Working Group C4.47 "Power system resilience"; and the Technical Chair of the 2022 International Symposium on Microgrids. Pierluigi is the recipient of a 2018 International Newton Prize for his research work on power system resilience to earthquakes in Chile and, in the past five years, has been a regular consultant for the Australian government, the Australian energy market operator, the Australian energy market commission, and the Australian energy regulator, on low-carbon power system security and resilience matters.
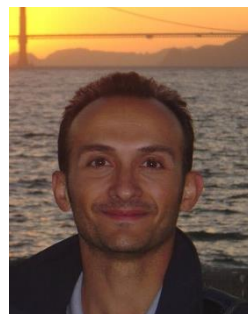
Tutorial Session 2.1
June 14, 2022 - 11:30 CEST

Pushing Intelligence to the Edge of Internet of Things: A new Paradigm enabling Next-Generation Smart Systems of Systems

Giancarlo Fortino
University of Calabria, Italy

ABSTRACT

Internet of Things will not be only a new worldwide network interconnecting trillions of (smart) devices but, most importantly, a platform (system of systems) where to develop a new wave of (cyber-physical) services for humans and machines. In this context, in order to build IoT systems, the so-called IoT-Edge-Cloud continuum paradigm is having tremendous focus from the research community as well as from the industry. This paradigm can therefore be an enabler to push intelligence from the core of the network to its edge: from centralized data mining to embedded machine learning in tiny IoT devices to federated machine learning involving networks of edge devices. Moreover, methodologies are emerging to support analysis, design, implementation and evaluation of solutions involving mining and machine learning at the IoT edge. In this talk, we will focus on IoT from both the architectural and machine learning at the edge perspectives. Finally, some use cases will be discussed related to mobile edge computing, ambient assisting living environments, and intelligent transportation systems.

SPEAKER BIO

Giancarlo Fortino (SM'12) is Full Professor of Computer Engineering at the Dept of Informatics, Modeling, Electronics, and Systems of the University of Calabria (Unical), Italy. He received a PhD in Computer Engineering from Unical in 2000. He is also distinguished professor at Wuhan University of Technology and Huazhong Agricultural University (China), high-end expert at HUST (China), senior research fellow at the Italian ICAR-CNR Institute, CAS PIFI visiting scientist at SIAT – Shenzhen, and Distinguished Lecturer for IEEE Sensors Council. He is Web of Science Highly Cited Researcher 2020. He is the chair of the PhD School in ICT, the director of the Postgraduate Master course in INTER-IoT, and the director of the SPEME lab at Unical as well as co-chair of Joint labs on IoT established between Unical and WUT, SMU and HZAU Chinese universities, respectively. His research interests include wearable computing systems, e-Health, Internet of Things, and agent-based computing. Fortino is currently the scientific responsible of the Digital Health group of the Italian CINI National Laboratory at Unical. He is

author of 500+ papers in int'l journals, conferences and books. He is (founding) series editor of IEEE Press Book Series on Human-Machine Systems and EiC of Springer Internet of Things series and AE of premier int'l journals such as IEEE TAFFC-CS, IEEE THMS, IEEE IoTJ, IEEE SJ, IEEE JBHI, IEEE SMCM, IEEE OJEMB, IEEE OJCS, Information Fusion, JNCA, EAAI, etc. He organized as chair many int'l workshops and conferences (100+), was involved in a huge number of int'l conferences/workshops (500+) as IPC member, is/was guest-editor of many special issues (60+). He is cofounder and CEO of SenSysCal S.r.l., a Unical spinoff focused on innovative IoT systems. Fortino is currently member of the IEEE SMCS BoG and of the IEEE Press BoG, and chair of the IEEE SMCS Italian Chapter.

Tutorial Track 3 - Smart Healthcare

Tutorial Session 3.1
June 14, 2022 - 09:00 CEST

The era of digital biomarkers in cardiovascular disease

Valentina Corino
Politecnico di Milano, Italy

ABSTRACT

According to the World Health Organization, cardiovascular diseases are the leading cause of death accounting for 30% of deaths worldwide. Among these diseases, the incidence and prevalence of pathologies related to atrial electrical disfunctions, mainly involving supraventricular arrhythmias (SVAs) are today reaching pandemic proportions. SVAs are highly debilitating for the patient, ranging from a reduced quality of life to the development of stroke events.

Today's standard for health screening is a clinical visit to a health facility where assessments are performed through the identification of biomarkers, that represent a snapshot in time that, on the one hand, may not identify the pathology, and, on the other hand, requires specific follow-on clinical visits. In this context, digital medicine may help through the use of technologies and tools for the measuring of human health biomarkers in a more pervasive and effective way, increasing the possibility of identifying the pathology and hence reducing the need for further visits. Data generated from wearables can potentially create personalized baselines for health and can help improve population health, advance clinical research, and guide the development of new devices. Collecting, processing and understanding of digital biomarkers extracted from such novel devices are an intensive and challenging process that requires an interdisciplinary effort, ranging from artificial intelligence to ethical and legal aspects.

SPEAKER BIO

Valentina Corino received the Master degree cum laude and the PhD degree in Bioengineering from Politecnico di Milano (Italy) in 2004 and 2008, defending a thesis on signal processing during atrial fibrillation. She continued her research on biomedical signal processing with main interests in signals of cardiovascular origin, especially regarding supraventricular arrhythmias to detect and characterize arrhythmia episodes. Her research activity also deals with analysis of biomedical images of oncological patients by means of radiomics to predict patient response to treatment. Since 2021 she is Associate Professor at the Department of Electronics, Information and Bioengineering, Politecnico di Milano and responsible of the LEGO lab (DigitaL tEchnologies for imaGing and sensOrs) inside the joint research

center "Cardio Tech-lab, Modeling and Application for Human Health" with IRCCS Centro Cardiologico Monzino (Milan, Italy). She is author of more than 50 peer reviewed papers on international journals, 5 book chapters and more than 60 conference papers.

Tutorial Session 3.2
June 14, 2022 - 11:30 CEST

Cardiovascular parameters and monitoring systems for patients in intensive care unit

Manuela Ferrario
Politecnico di Milano, Italy

ABSTRACT

In this tutorial the circulatory shock will be defined and used as a key example to show the importance for the hemodynamic monitoring in the intensive care unit (ICU). As covid pandemic taught us, ICU is particular hospital ward where patients with severe or life-threatening illnesses and injuries are admitted, they require constant care, close supervision from life support equipment and medication in order to be stabilized and to avoid life-threatening events. ICUs are staffed by highly trained physicians, nurses and respiratory therapists. The available technology and the key methodological aspects behind the parameters commonly used in clinical practice will be overviewed (e.g. gold standard measurement and beat-to-beat estimation of cardiac output, estimation of cardiac afterload and preload). The integration of artificial intelligence in the monitoring systems represents a great opportunity, the automatic risk stratification could be helpful in prioritizing risky patients and in better managing the staff workload. Some examples will be illustrated.

SPEAKER BIO

Manuela Ferrario (PhD in Bioengineering, 2007) has been Assistant Professor (2011-2021) and she has been Associate Professor at Politecnico di Milano since 2021. She collaborated with the Renal Research Institute, New York City, USA and with the Hospital San Bortolo, Vicenza on the analysis of heart rate variability (HRV) and biological cardiovascular signals in haemodialysis patients (Fresenius Medical Care fellowship). She collaborated with Università Tor Vergata, Roma, on methods to identify perioperative cardiovascular and hemodynamic risk in patients under anesthesia and to monitor cardiovascular hemodynamics invasively/noninvasively during surgical intervention (grant FIRB 2010-2013). He worked on vital signals for affective computing in psychological disorders in collaboration with San Raffaele Hospital and Università degli Studi di Milano (grant FIRB 2013-2016). She was in charge of hemodynamic monitoring (WP#7) and member of the scientific committee of the EU project "Shockomics: multiscale approach to the identification of molecular biomarkers in acute heart failure induced by shock" (2013-2017).

Her research interests include: machine learning and data mining techniques for metabolomics data analysis and multilevel integration; hemodynamics monitoring and mathematical modeling of cardiovascular system; methods to estimate autonomic control systems from non invasive or minimally invasive recordings in critical ill patients; artificial intelligence methods to analyse large scale database with data collected from ICU patients.

Tutorial Track 4 - Digital Communities

5G localization: from research to standardization

Domenico Giustiniano
IMDEA Networks

Mythri Hunukumbure
Samsung R&D, U.K.

ABSTRACT

Localization will greatly increase the overall value of the 5G ecosystem and beyond, exploiting both new waveforms, denser deployments, larger bandwidths and antennas, as well as other wireless technologies integrated in todays' smartphones. The 3GPP localization framework (eLCS) is also expanding to support these developments, but new technical challenges have also emerged in supporting different 5G verticals. Building on top of the current effort in 3GPP, the main findings from the research conducted in the framework of the H2020 LOCUS project will be presented, as well as its contribution to the ongoing standardization activities until the most recent Release 18. Future directions for 3GPP eLCS to evolve are also discussed, in view of the current challenges.

SPEAKER BIO

Domenico Giustiniano is Research Associate Professor (tenured) at IMDEA Networks Institute and leader of the Pervasive Wireless System Group. Dr. Giustiniano is leader of the OpenVLC project, an open-source platform for research in visible light communication networks and co-founder of the non-profit Electrosense association, a crowd-sourcing initiative to collect and analyse spectrum data. Before joining IMDEA, he was a Senior Researcher and Lecturer at ETH Zurich. He also worked for a total of four years as Post-Doctoral Researcher in industrial research labs (Disney Research Zurich and Telefonica Research Barcelona). He holds a PhD in Telecommunication Engineering from the University of Rome Tor Vergata (2008), and Executive Education from IE Business School on Management Fundamentals and Skills for

Scientists and Researchers (2021). He is the project coordinator of the H2020 European Training Network ENLIGHT-EM on low-energy Visible Light Communication for IoT (2019-2023). Dr. Domenico Giustiniano is senior member of IEEE and ACM societies.

Mythri Hunukumbure is a Principal Research Engineer and a Project Lead at Samsung Electronics R&D Institute UK. In an industry career spanning over 15 years, he has contributed to and later led mobile communication research, standardisation and product development activities. Prior to joining Samsung UK, he was with Fujitsu Research Labs Europe. While at Samsung, he has participated in flagship EU projects mmMAGIC, ONE5G and 5G LOCUS as work package leader. Also he is actively contributing to 3GPP RAN1 and SA2 standardisation topics, securing vital IPR. His current research activities involve looking at novel 5G deployment models for emergency services and he has contributed to further the developing Emergency Services Network (ESN) discussions in UK. He has filed around 40 patents and has also published extensively in leading IEEE conferences and journals, receiving best paper award at the World Telecommunications Congress (WTC) in 2012.

Recent Advances in the Assessment and Certification of AI Ethics

Ali Hessami

Chair & Technical Editor, IEEE 7000 Standard
Vice Chair and Process Architect, IEEE Ethics Certification Program for Autonomous and Intelligent Systems

ABSTRACT

This tutorial will cover the latest advances on technology ethics and two IEEE initiatives namely IEEE 7000 standard and the Ethics Certification Programme for Autonomous and Intelligent Systems (ECPAIS). These provide a basis for raising awareness and providing a systematic framework for the innovators, researchers and technologists as well as small and large enterprises involved in AI and technology innovation and development. The main focus is on Autonomous Decision Making and Algorithmic Learning Systems and two complementary approaches to the risk reduction in societal harms and ethical assurance of these technologies.

SPEAKER BIO

Ali is currently the Director of R&D and Innovation at Vega Systems. He extensive track record in systems assurance and safety, security, sustainability, knowledge assessment/management methodologies and has a background in design and development of advanced control systems for business and safety critical industrial applications. Ali represents UK on CENELEC & IEC safety systems, hardware & software standards committees. He was appointed by CENELEC as convener of a number of Working Groups for review of EN50128 Safety Critical Software Standard. Ali also a member of Cyber Security Standardisation WG26 Group and started and chairs the IEEE SMC and the Systems Council Chapters in the UK and Ireland Section. During 2017 Ali joined the IEEE Standards Association (IEEE SA) initially as a committee member for the new landmark IEEE 7000 standard focused on "Addressing Ethical Concerns in System Design". He was subsequently appointed as the Technical Editor and later the Chair of IEEE 7000 standard. In November 2018, he was appointed as the VC and Process Architect of the IEEE 's global Ethics Certification Programme for Autonomous & Intelligent Systems (ECPAIS). Ali is a Visiting Professor at London City University's Centre for Systems and Control in the School of Engineering & Mathematics and at Beijing Jiaotong University School of Electronics & Information Engineering. He is also a Fellow of Royal Society of Arts (FRSA), Fellow of the UK Institution of Engineering & Technology (IET) and a Life Senior Member of IEEE.

IEEE MELECON 2022 Invited Speakers

Invited Speakers Track 1 - Smart Energy

Session S1D: Electrical Machines and drivers for Industry
June 15, 2022 - 10:00 CEST

Advanced Grid-Connected Power Electronics for Power Quality

Hadi Kanaan
Saint-Joseph University of Beirut, Lebanon

ABSTRACT

The massive proliferation of nonlinear electric devices at the load level (three-phase rectifiers, adjustable-speed drives, uninterruptible power supplies, etc.) and the generation level (renewable sources, storage devices, etc.) could have a severe impact on the power quality of the grid. The presence of current and/or voltage harmonics may cause technical and economic damages due to additional losses in the transmission lines, over-voltages, over-heating, Electro Magnetic Interference (EMI) problems, and other undesirable effects. In addition, harmonic reduction is becoming more and more relevant due to the limitations imposed by grid requirements by international standards. This talk will address the solutions adopted to mitigate power quality issues in distributed power systems, at the load, generation and distribution levels. More specifically, it will present advanced power electronics topologies used for power quality enhancement and reactive power compensation in the grid. Also, the mathematical modeling of the converters will be addressed on the basis of which control systems are designed. Several case studies will be presented and discussed.

SPEAKER BIO

Hadi Y. Kanaan (S'99-M'02-SM'06) received the diploma in electromechanical engineering from Saint-Joseph University of Beirut (USJ), the Ph.D. degree in electrical engineering from Ecole de Technologie Supérieure (ETS), Montreal, Canada, and the Habilitation à Diriger des Recherches (HDR) from the Université de Cergy-Pontoise, Paris, France, in 1991, 2002 and 2009 respectively. He is currently a Full-Professor, Head of the Department of Graduate Studies at Ecole Supérieure d'Ingénieurs de Beyrouth (ESIB) and Director of the Doctoral School of Sciences, Engineering and Technology at USJ, which he joined in 2001, and executive member of the USJ Research and Technology Transfer Office since 2019.

He is also an Associate Professor at ETS, Canada, since 2021, and associate member of the Canada Research Chair in Energy Conversion and Power Electronics since 2001. His research interests concern modeling and control of switch-mode converters, modern rectifiers, power factor correction, active power filters, and grid-connectivity of renewable energy systems. He is an author of 1 book, 3 book chapters, 1 patent and more than 260 technical papers published in international journals and conferences. He served as an Associate Editor of the IEEE Transactions Industrial Electronics, and is currently an Associate Editor of the IEEE Journal of Emerging and Selected Topics on Industrial Electronics (JESTIE). He is a member of the IEEE Power Electronics Society (PELS), Industrial Electronics Society (IES) and Industry Applications Society (IAS). He is also the vice-chair of the IEEE Lebanon Section and an Excom member of the IE/PE/CAS/PEL Joint Chapter in Lebanon.

Status of design and procurement activities in DTT tokamak project area

Gian Mario Polli
DTT S.C.a r.l., ENEA FSN Department, Frascati, Italy

ABSTRACT

DTT, Divertor Tokamak Test facility, is one of the largest nuclear fusion facility under construction in Europe after ITER. Its mission is to provide an integrated nuclear fusion environment where to test power exhaust strategies useful for the first nuclear fusion power plant. It is a fully superconducting tokamak capable of confining deuterium plasmas with high flexibility with respect to shaping and strike point sweeping. Maximum plasma current of $Ip = 5.5$ MA and toroidal magnetic field of 6 T at the plasma center makes DTT in a position relevant for the present DEMO design. In late 2019, a consortium has been established with the aim at translating the theoretical and technological knowledge of the partners in the design, in the construction and subsequent experimental management and implementation of the Divertor Tokamak Test machine. To the DTT consortium have finally adhered ten partners representing the leading laboratories and universities involved in nuclear fusion in Italy, and the largest Italian oil company. One of the first activities concerned the development and start-up of the project coordination structure. Subsequently the Integrated Project Team started the engineering design phase with the aim at keeping the maturity of the different DTT systems and components so to guarantee the respect of the challenging schedule of construction. This effort led the DTT team to the completion of the design of the systems in critical path in late 2021 and hence to the start of procurement activities. The paper reports the main resulting final design and technical solutions for the systems of the tokamak area whose procurement activities have started or are about to start, and gives an overview of the forthcoming activities.

SPEAKER BIO

Gian Mario Polli is an aerospace engineer. He graduated in 2001 at University of Rome "La Sapienza" and got a PhD in aerospace structures and materials from the same University in 2005. In 2007, he joined the superconductivity lab in ENEA specializing in the design and testing superconducting magnets. In 2011 he became technical responsible officer of the contract for the procurement of 9 superconducting TF coils of JT-60SA. From 2018 he joined the DTT team having responsibility of the coordination of the technical activities. From 2021 he has been nominated Tokamak Hall work package manager having responsibility of the design and procurement of a large part of the tokamak systems and components.

![IEEE MELECON Palermo 2022]

Electric ship design: concepts, research challenges, proofs

Giorgio Sulligoi
University of Trieste, Italy

ABSTRACT
The keynote will present main trends and reasons for transportation electrification in the marine sector. The keynote will cover the following aspects:
- Ships power system evolution.
- Shipboard electrical technologies (Integrated Power & Energy Systems).
- MVDC power systems on ships.
- Electric ship design (methods and tools) & proof of concepts.
- Analysis, evaluation and re-design of different types of shipboard power systems.

SPEAKER BIO
Giorgio Sulligoi (Senior Member IEEE) earned the Ph.D. (University of Padua, 2005) and the M.Sc. (University of Trieste, 2001), both in Electrical Engineering. He is the founder and Director of the grid connected & marine Electric Power Generation and Control laboratory (EPGC lab.) at the Department of Engineering and Architecture of the University of Trieste. He joined the University of Trieste as an Assistant Professor of Electric Power Generation and Control by 2007, tenured since 2010, appointed Associate Professor of Shipboard Electrical Power Systems since 2016 and elevated to Full Professor in 2019. Dr. Sulligoi has been Deputy Rector for Community Affairs and Business Relations of the University of Trieste, Italy in 2013-2019. Prior to joining University of Trieste, he worked as Deputy Manager R&D in a small private industrial company (M.A.I. Control Systems, Milan, Italy) where he has developed, tested and commissioned innovative releases of digital voltage control systems for power stations participating to primary and secondary voltage regulation, both in Italy and abroad. Dr. Sulligoi spent a semester (2003/2004) at the University College of Cork (Dept. of Engineering) as a visiting Ph.D. student. He carried out an internship (2000/2001) at the Fincantieri design center of Trieste (Merchant Ships – Electrical and Automation office). He is the author of more than 160 scientific papers in the fields of shipboard power systems, all-electric ships, generators modeling and voltage control, where he also has earned some scientific awards. He is one of the technical program chairmen of ESARS (the International Conference on Electrical Systems for Aircraft, Railway and Ship Propulsion). He has been the Scientific Manager of the MVDC Large Ship research program (funder: Regional Government of Trieste, lead partner: Fincantieri; research partners: University of Trieste, Polytechnic of Milan) and of the Naval Smart

Grid research program (funder and lead partner: Italian Navy; research partners: University of Trieste, Polytechnic of Milan, University of Rome "Sapienza"), both in the field of the next generation integrated power systems for all electric ships. Dr. Sulligoi is a member of many technical/scientific committees and working groups in the field of marine electrical applications. He is a Registered Professional Engineer in Italy. He is member of IEEE (PES, PELS, IAS). He is a reviewer for a number of International Conferences and Journals . He is the Vice-President of the AEIT (Italian Association of Electrical Engineers) Section of the Friuli Venezia Giulia region. In the past, he has been a member of the Board of Directors of ACEGAS-APS S.p.A., distribution system operator in Trieste/Padua (traded on Milan Stock Exchange), Italy, and a member of the Board of Directors of Sincrotrone Trieste S.c.p.A., a joint stock company of national interest managing the Synchrotron Light Source "Elettra" and the Free Electron Laser "FERMI@Elettra" research laboratories in Trieste, Italy. Presently he is a member of the Board of Directors of the Maritime Technology Cluster of the Friuli Venezia Giulia region (MARE-TC FVG), in Italy, where he served also as President of the Technical-Scientific Committee. He is also member of the Boards of Directors of CINEAS (Italian Consortium in Insurance Engineering), ENSIEL (Italian Consortium on Power Systems) and CINIGEO (Italian Consortium on Georesources).

Session S1G - P1: Smart solution for high penetration of PV generation in Renewable Energy Communities - Part 1
June 16, 2022 - 10:00 CEST

Demand-Side Management and Sector Coupling to Optimize the Integration of PV Generation in Renewable Energy Communities

Daniela Proto
University of Naples Federico II, Italy

ABSTRACT

The increasingly stringent environmental issues have evidenced the need to push the energy transition forward and have even more intensively stimulated the widespread use of renewable energy to satisfy the energy requirements. To deliver on the energy transition, one of the challenges to afford is the availability of the primary source which is typically very variable due to its dependency on weather conditions, this posing economical and grid operation security issues. This context still makes fossil fuels the kingmakers for energy provision and electricity pricing. To foster the transition to renewables, the economic and operational participation and ownership by members of a community in a renewable energy project can be a fundamental enabler and PV generation has a key role. Enhancing local system efficiency, providing flexibility through optimal grid operation, and integrating more renewable energy are the main tasks to develop. The discussion will deal with challenges as well as possible solutions for the optimal integration of PV generation systems in renewable energy communities. Distributed energy resources as enabling technologies for the energy transition will be explored and models and strategies to harness demand-side management and sector coupling will be discussed. Methods to integrate probabilistic approaches and forecasting tools in the optimization models will be briefly presented.

SPEAKER BIO

Daniela Proto received the M.Sc. and Ph.D. degrees in electrical engineering from the University of Naples Federico II, Naples, Italy, in 2000 and 2004, respectively, and a postgraduate master's degree in software technologies from the University of Sannio, Benevento, Italy, in 2001. She is currently Associate Professor at the Department of Electrical Engineering and Information Technology of the University of Naples Federico II. She has achieved the national scientific qualification for the role of Full Professor. She is Senior Member IEEE and member of the IEEE Italy Section Board. She was member of the IEEE Task Forces 'Probabilistic Aspects Harmonics' and 'Harmonics Modeling and Simulation'. She was Principal Investigator/Responsible for activities in agreements between University of Naples Federico II and private companies. She is Principal Investigator for the activities of the partner 'University of Naples

Federico II' of the European Project 'Real-Time Distribution Grid Control and Flexibility Provision under Uncertainties – DiGriFlex', in the frame of ERA-Net SES RegSys 2018 call of HORIZON 2020. She has been involved in several research projects resulting from the collaboration of the University with industry and research centers. She is Associate Editor of the International Transactions on Electrical Energy Systems (Wiley) and Academic Editor of the following international journals: Energies (MDPI), Journal of Control Science and Engineering (Hindawi Publishing Corporation), Journal of Electrical and Computer Engineering (Hindawi Publishing Corporation). Since 2002 she has been working on research and teaching activities mainly focusing on optimal planning and operation of power distribution systems and smart grids and electrical transport systems. She is co-author of more than 100 publications appearing in International Journals, in proceedings of national and international conferences and in books.

Understanding the Italian electricity markets through the data analytics approach

Tao Huang
Politecnico di Torino, Italy

ABSTRACT

As a very peculiar electricity market with a zonal mechanism, a considerable amount of two distinct renewable resources dominating in different market zones, and various sizes of market players, the Italian electricity market shows various features the traditional methods fail to capture and understand. The talk will discuss 3 main aspects of the Italian electricity markets using data analytics approaches: 1) the market price features under different time horizons and comparing several forecasting techniques based on these features, 2) the planning of the renewable energies based on the impact of operational and physical features of increasing wind and solar generation on the prices, 3) the short/long term market power and its detection.

SPEAKER BIO

Tao Huang received his PhD degree in Electrical Engineering from Politecnico di Torino, Italy in 2011. He is currently an associate professor at the Department of Energy at Politecnico di Torino. He is also an associate researcher with Shanghai Jiao Tong University, China and adjunct chair professor at Xihua University, China and Polytechnic University of Henan, China. He has been an invited international expert to the Energy Security, Systems and Market Unit at the European Commission, Joint Research Centre, Institute for Energy and Transport to advance the modelling of distribution system operators, and regional electricity systems. He has been invited as a visiting scientist to Durham University, UK. He co-coordinated and participated in several EC FP7, EC H2020, the international and national research and industrial projects, as well as tenders from the European Commission. Currently, he is also an external International scientific advisor for the Global Energy Interconnection Research Institute (Europe), State Grid Cooperation of China (former Smart Grid Research Institute Europe of State Grid Cooperation of China) and International scientific advisor for the State Energy Smart Grid R&D Center (Shanghai, China). He is also Standing Director of IEEE PES power system Relaying & control Satellite Committee-China, Power system Operation & Control Subcommittee. His research interests include complex system science and its applications to electricity/energy systems, electricity markets, policy decision making aid, energy security, critical infrastructure protection, emerging distribution grids (Smart grids), data analytics, etc.

Microgrids for energy communities: the power sharing model

Luigi Martirano
Sapienza University of Rome, Italy

ABSTRACT

An important share of energy consumption is due to residential, tertiary and commercial buildings. The talk aims to highlight the advantages of liberalizing distributed generation combined with the possibility of aggregation of users, transforming the electrical infrastructure into an aggregate of mini and micro networks. In the future it will be increasingly possible to produce energy closer to where it is consumed, extending the transformation of passive consumers into active consumers, either directly or through aggregations. In this scenario, the electricity transmission and distribution networks are destined to profoundly change their role, which will be that of guaranteeing a reliable connection capable of allowing exchanges between the various generations of electricity and overcoming the criticality deriving from the aleatory nature of some renewable sources. Pending the complete transformation of the system, the talk proposes a smart microgrid model for aggregating users to share the power produced by common generators and energy services. The model foresees that the energy provided by common generation (e.g. photovoltaic) is shared among users in a unidirectional way, so that each user remains passive towards the distributor. This feature allows the model to be easily implemented in full compliance with national regulations. This speech discusses the feasibility of the project through a dynamic model, which is used to show its effectiveness in several case studies.

SPEAKER BIO

Luigi Martirano (Senior Member, IEEE) received the M.S. and Ph.D. degrees in electrical engineering from the University of Rome "Sapienza," Rome, Italy, in 1998 and 2003, respectively. In 2000, he joined the Department of Electrical Engineering, Sapienza University of Rome, where he is currently a Full Professor of electrical power systems. He is currently the Coordinator of the PhD School "Engineering and Applied Science for Energy and Industry", the coordinator of the Electrical Area of the Department of Astronautics, Electrical and Energy Engineering (DIAEE) and the responsible of the Laboratory of Electric Power Systems and Building Automation of the DIAEE. He is Secretary of the National Research Group GUSEE – Gruppo Universitario "Sistemi Elettrici per l'Energia". He has authored more than 220 papers in international journals and conference proceedings. He is the Founder of a Startup, operating in the fields of building automation and energy monitoring systems. His research interests include safety and reliability in power systems, MV/LV power networks, building automation, domotics, lighting.

Session S1H - P2: Energy Harvesting, Wireless Power transfer and Power Electronics Systems - Part 2
June 16, 2022 - 11:00 CEST

Remote Sensing Networks: Technical Problems, Benefits and Challenges

Minh T. Nguyen
Thai Nguyen University of Technology, Vietnam

ABSTRACT

Remote sensing has proven to be a viable technology for monitoring and collecting data in a variety of sectors and over a wide range of climatic conditions and locales throughout the last few decades. This talk considers sensing networks that include devices and the networking methods to support different applications. For further details, the talk specify some networks as, wireless sensor networks, robotic networks (mobile robots/sensors), unmanned aerial vehicles (UAVs) networks. Data collection algorithms in the networks are addressed. Some data processing advanced techniques in the networks are also provided. In order to navigate the mobile devices in such networks, some control algorithms for mobile agents are considered. Finally, the energy efficient problems for the sensing devices are addressed. The talk will provide some potential points for either future developments or research collaborations.

SPEAKER BIO

Minh T. Nguyen received his B.S., M.S. and PhD degrees in Electrical Engineering from Hanoi University of Communication and Transport, Hanoi, Vietnam in 2001, Military Technical Academy, Hanoi, Vietnam in 2007, Oklahoma State University, Stillwater, OK, USA, in 2015, respectively. Associate Prof. Dr. Minh T. Nguyen is currently the Director of International training and Cooperation center (ITC) at Thai Nguyen University of Technology (TNUT), Viet Nam, and also the director of Advanced Wireless Communication Networks (AWCN) Lab. He has interest and expertise in a variety of research topics in the communications, networking, and signal processing areas, especially compressive sensing, and wireless/mobile sensor networks. He serves as technical reviewers for several prestigious journals and international conferences. He also serves as Editors for some journals as, Wireless Communication and Mobile Computing and Transactions on Industrial Networks and Intelligent Systems and Editor in Chief for ICSES Transactions on Computer Networks and Communications.

Advanced Wireless Charging Solutions for Autonomous E-mobility and Future Transportation Electrification

Sheldon S. Williamson
Ontario Tech University, Canada

ABSTRACT

Driverless, autonomous electrified means of micro-mobility were already touted to bring progressive lifestyle changes to civilization. Examples include: E-bikes, drones, unmanned aerial vehicles, scooters, and skateboards, just to name a few. With the outbreak of the pandemic, humankind around the world are desperately seeking rapid commercialization of autonomous micro-mobility solutions, especially to avoid human interface. It is clear that electrified autonomous means of micro-mobility will become an essential support for humans, by satisfying essential services and needs, without the necessity for human contact, thus respecting social distancing guidelines. One of the key issues, however, with micro-mobility, is that their batteries do not last too long. Therefore, they have to be recharged ever so often, and this takes 45-60 minutes. In addition, micro-mobility devices have major cargo restrictions, whereby carrying bulky battery packs is impractical.

This seminar will present innovative solutions to these issues in the form of completely autonomous, weatherproof, wireless rapid recharging. Wireless charging can provide rapid recharge within ~2-3 minutes, making micro-mobility almost entirely autonomous, and literally allowing their on-board batteries to juice-up "on-the-move." This talk will present the design, testing, and implementation of practically developed inductive power transfer (IPT), capacitive power transfer (CPT), and hybrid IPT/CPT chargers, with power ranging between 500 Watts to 7.7 kW. The results derived from these designs contribute specifically to the enhancement of wireless charging research for future micro-mobility, as well as for e-transportation, in general. Alternatively, the lessons learned will, at the very least, facilitate the generation of new ideas.

SPEAKER BIO

Sheldon S. Williamson (S'01–M'06–SM'13–F'20) received his Bachelors of Engineering (B.E.) degree in Electrical Engineering with high distinction from University of Mumbai, Mumbai, India, in 1999. He received the Masters of Science (M.S.) degree in 2002, and the Doctor of Philosophy (Ph.D.) degree (with Honors) in 2006, both in Electrical Engineering, from the Illinois Institute of Technology, Chicago, IL, specializing in automotive power electronics and motor drives, at the Grainger Power Electronics and Motor Drives Laboratory. Currently, Dr. Williamson is a Professor at the Smart Transportation

Electrification and Energy Research (STEER) group, within the Department of Electrical, Computer, and Software Engineering, at Ontario Tech University, in Oshawa, Ontario, Canada. He also holds the prestigious NSERC Canada Research Chair position in Electric Energy Storage Systems for Transportation Electrification. His main research interests include advanced power electronics and motor drives for transportation electrification, electric energy storage systems, and electric propulsion. Prof. Williamson is a Fellow of the IEEE.

Session S2B: Modelling and Analysis of Advanced Products and Manufacturing Processes
June 15, 2022 - 11:00 CEST

Digital Twins Paradigm: the Industry 4.0 way for the Simulation and Modelling

Giambattista Gruosso
Politecnico di Milano, Italy

ABSTRACT

Within the digital transformation of the industry, digital twins play a key role. They combine simulation models and data collected from the field to create platforms in which to analyze, manage and predict phenomena.
This talk will present the main principles of digital twins and the challenges and opportunities related to it in different areas of engineering.
In particular we will see how model-based digital twins can be integrated with data-driven digital twins to become enablers of methodologies based on Machine Learning and Artificial Intelligence.

SPEAKER BIO

Giambattista Gruosso is an Associate Professor at Politecnico di Milano
His main research interests include modeling, simulation, and electrical systems design, focusing on industrial automation and electric mobility.
His expertise in automation and electrical engineering make him a a reference point on introducing innovation processes in industrial and trasportation sectors.
He is authors of several pubblication related to the topics of model-based and data-driven digital twins of electrical and electronic systems.
In the last years, the research activity focuses on the digital transformation of the electrical systems and components and the modeling of traditional electrical systems integrated with their digital part. The core of its activities is the realization of Digital Twins of electrical systems using mixed techniques of Hardware in The Loop simulation to validate electrical architectures' behavior integrated with digital systems of supervision, automation, and data collection. In particular, the activities of the laboratory concern the implementation of 4.0 technologies for electrical systems.
He is scientic resposible of the technical area of the Compentence Center for industry 4.0 MADE (www.made-cc.eu).

Invited Speakers Track 3 - Smart Healtcare

Session S3B: Nanostructured devices and smart materials for biophotonics applications
June 15, 2022 - 11:00 CEST

Machine learning based non-invasive bloodstream glucose monitoring via multimode optical fiber sensor

Zeev Zalevsky
Bar-Ilan University, Israel

ABSTRACT

The ability to perform frequent non-invasive monitoring of glucose in the bloodstream can be very applicable for diabetic patients. In this presentation we present and in-vivo experimentally verify a non-invasive technique for sensing glucose concentration in the bloodstream based on analysis of light emitted from a multimode fiber that is being attached to the skin. The sensor contains a multimode fiber, laser source, the digital camera capturing and processing the speckle pattern image emitted from the fiber's exit. The time changing speckle patterns are analyzed using machine learning approaches.

The experiments were performed on small group of subjects by using a covered (with cladding) and uncovered (without cladding) multimode fiber under normal condition and under applied AC magnetic field affecting the tested skin area. The technique is based on tracking changes in primary speckle patterns produced in the fiber as a function of the glucose concentration in the bloodstream. Since the glucose exhibits magneto-optic effect, the applied magnetic field produces measurement exhibiting high specificity. Thus, the uncovered fiber was irradiated with AC magnetic field (150 Gauss) at 140 Hz to have a lock-in amplification role, improving the observability of the relatively small magneto-optic effect and therefore increasing the accuracy of glucose levels sensing. The uncovered fiber was tapered to allow tails of the photonic mode propagated through the fiber, to interact with the nearby finger tissue of the inspected subject.

The application of machine learning algorithms in preprocessed speckle data enhanced glucose classification accuracy. Classification of the speckle patterns for uncovered fiber with an AC magnetic field applied allows detection of the normal and elevated blood glucose levels for different subjects with high accuracy.

SPEAKER BIO

Zeev Zalevsky received his B.Sc. and direct Ph.D. degrees in electrical engineering from Tel-Aviv University in 1993 and 1996 respectively. Zeev is currently a full Professor and the Dean of the faculty

of engineering in Bar-Ilan University, Israel. His major fields of research are optical super resolution, biomedical optics, nano-photonics and fiber-based processing and sensing architectures. Zeev has published more than 550 peer review papers, 335 proceeding papers, 9 books (6 authored and 3 as an editor), 32 book chapters and about 100 patents. Zeev gave about 620 conference presentations with more than 220 invited/keynote or plenary talks.

Zeev is a fellow of many large scientific societies such as SPIE, OSA, IEEE, EOS, IOP, IET, IS&T, ASLMS, AIMBE and more. He is also a fellow of the American National Academy of Inventors (NAI). For his work he received many national and international prizes such as the Krill prize, ICO prize and Abbe medal, SAOT prize, Juludan prize, Taubelnblatt prize, young investigator prize in nanotechnology, the International Wearable Technologies (WT) Innovation World Cup 2012 Prize, Image Engineering Innovation Award, NANOSMAT prize, SPIE startup challenge prize, SPIE prism award, IAAM Scientist Medal Award, International Photonic Award, Dr. Horace Furumoto Innovations Professional award, The Asian Advanced Materials Award, Edison Award, IEEE distinguished lecturer award, VEBLEO Scientist Award, Joseph Fraunhofer Award/Robert M. Burley Prize, Lotfi Zadeh Memorial Award, E&T Innovation Award, CES (Consumer Electronics Show) 2022 Innovation Awards and more.

Besides his academic research activity, Zeev is also very active in commercializing his inventions into start-up companies. Zeev was and is involved in technologically leading of more than 10 startup companies.

Session S3C - P1: Neural and Cognitive Engineering - Part 1
June 15, 2022 - 14:30 CEST

The future of sleep medicine for biomedical engineering

Thomas Penzel
Scientific Chair of the Interdisciplinary Center of Sleep Medicine

ABSTRACT

Sleep disorders are found to be more prevalent than previously realized. This may be a consequence of a modern society which optimizes work and social activities up to the edge. In order to investigate normal and disturbed sleep, we record biosignals both in the sleep laboratory and at home. Signals may be recorded directly, such as EEG, EOG, EMG from the head of the sleeping person, or indirectly, such as ECG, heart rate, respiration, pulse wave. Signals may be recorded with little contact or no contact systems such as actigraphy, body movement, bed sensors or bedside radiofrequency sensors. Some signals are new in sleep research and require new technology and analysis concepts. Always biosignals were recorded with an appropriate time and amplitude resolution, and then we derive physiological functions. We can identify wakefulness and sleep, we can derive details about sleep, such as light sleep, deep sleep, and REM sleep, arousals and sleep fragmentation. Not only classical methods in the time and frequency domain are used, but also more recent methods using statistical approaches are applied. This allows recognizing normal and restorative sleep and identifying sleep disorders as well. Some sleep disorders imply cardiovascular consequences and require treatment. Sleep disordered breathing is the disorder with most cardiovascular consequences. Many diagnostic tools like wearables focus on this group of disorders.

SPEAKER BIO

Thomas Penzel graduated from physics (1986), human biology (1991), and physiology (1995) at the University Marburg, Germany. Since 2006 he is the director of research of the Interdisciplinary Sleep Medicine Center at the Charité – Universitätsmedizin Berlin (Germany). In 2001, he received the Bial award for Clinical Medicine in Portugal, in 2008 the Bill Gruen Award for Innovations in Sleep Research by the American Sleep Research Society, and in 2014 the distinguished research award by the Chinese Sleep Research Society. He was elected as IEEE EMB distinguished lecturer for 2021-2023 and is IEEE fellow since 2022. Since 2020 he is president of the German Sleep Society He is editor of the journal Sleep and Breathing, and editorial board member of journals in the field of sleep research and biomedical engineering. His research interests are sleep medicine, biomedical signals, wearables for sleep recording, the cardiovascular and the neural system related to the sleep-wake regulation, and the pathophysiology of sleep disordered breathing.

The ultrasound revolution, from ultrafast to molecular imaging

Massimo Mischi
Eindhoven University of Technology, The Netherlands

ABSTRACT

Ultrasound technology is experiencing impressive advances that are opening revolutionary applications for diagnostic imaging and even patient monitoring. The introduction of ultrafast ultrasound solutions allows achieving unprecedented frame rates. Along with the rise of artificial intelligence (AI), this is leading to a tremendous boost of the image quality. Besides, these frame rates also enable novel quantitative imaging. Characterization of the viscoelastic properties of tissue, with important benefits for cancer imaging, as well as characterization of natural waves, such as electromechanical cardiac waves or uterine peristaltic waves, are powerful diagnostic options enabled by novel ultrasound technology. In combination with ultrasound contrast agents, ultrafast ultrasound has even shown the ability to beat the diffraction limit, resolving the tiniest microvessels by ultrasound localization microscopy. Moreover, the introduction of novel contrast agents that are targeted to expressions of cancer angiogenesis are paving the way for ultrasound molecular imaging, supported by dedicated pharmacokinetic modeling. Altogether, quantitative ultrasound imaging provides powerful, complementary biomarkers that establish the basis for improved diagnostics through their optimal combination by novel AI models. And the future of medical ultrasound goes beyond clinical diagnostics, as novel ultrasound patches promise nowadays to make the transition towards ultrasound ambulatory monitoring. This talk will provide an overview of all these exciting advances and the envisioned future of medical ultrasound.

SPEAKER BIO

Massimo Mischi is professor of biomedical signal analysis at the Eindhoven University of Technology (Netherlands), where he leads the Biomedical Diagnostics lab. Today the lab includes about 100 researchers working on biomedical signal analysis with applications ranging from electrophysiology to diagnostic imaging. Improved analysis of biosignals is pursued by modelling the full measurement chain, from (patho)physiological sources to sensing physics up to diagnostic interpretation. Prof. Mischi's research on ultrasound imaging of angiogenesis was awarded with several personal grants (VIDI, ERC Starting Grant, ERC Proof of Concept). Overall, he contributed to 165 peer-reviewed journal papers, 10 book chapters, >300 conference contributions, 13 patents, 67 invited talks at international conferences, and one book. His scientific output has also led to the foundation of two start-up companies on

neuromuscular rehabilitation (HiPerMotion) and cancer diagnostics by ultrasound technology (Angiogenesis Analytics). He currently serves as associate editor for the IEEE T-UFFC, IEEE RBME, CMPB, Sensors, and IRBM. He is also chairman of the IEEE EMBS Benelux Chapter, board member of the Urological Imaging Section of the European Association of Urology, and secretary of the Dutch Society of Medical Ultrasound.

Session S4B: 5G and beyond Wireless Networks and Applications
June 15, 2022 - 11:00 CEST

A Spatio-Temporal Signal Dimension Reduction Method for Integrated Localization and Sensing

Yuan Shen
Tsinghua University, China
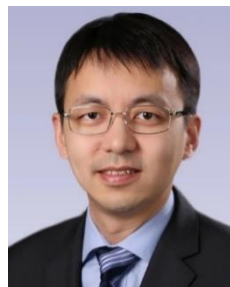
ABSTRACT

The development of millimeter-wave frequency band and large-scale antenna arrays offers great opportunities for high-accuracy localization and sensing, but at the cost of large communication overheads, big memory, and complex computation. In this context, effectively reducing signal dimension to alleviate resource consumption is essential in practice. In this paper, we propose a spatio-temporal signal dimension reduction method, which reduces signal dimensions without information loss for integrated localization and sensing. Different from the existing reduction methods only considering one domain, we reduce both the temporal and the spatial signal dimensions and reveal the compressible property of the array signals.

SPEAKER BIO

Yuan Shen (Senior Member, IEEE) received the B.E. degree in electronic engineering from Ts- inghua University in 2005, and the S.M. and Ph.D. degrees in electrical engineering and com- puter science from the Massachusetts Institute of Technology (MIT) in 2008 and 2014, respectively.
He is currently a Professor with the Department of Electronic Engineering, Tsinghua University. His current research focuses on network localization and navigation, resource allocation, inference techniques, and cooperative networks. He has served as the TPC Symposium Co-Chair for IEEE ICC and IEEE GLOBECOM for several times. He was the Elected Chair for the IEEE ComSoc Radio Communications Committee from 2019 to 2020. He is also an Editor of the IEEE Transactions on Communications, IEEE Transactions ON WIRELESS COMMUNICATIONS, IEEE WIRELESS COMMUNICATIONS LETTERS, and China Communications.

Smart ecosystems at the root of the wellbeing in education: from theoretical definitions to practical implementations

Carlo Giovannella
ASLERD & University of Rome Tor Vergata, Italy

ABSTRACT

In this presentation we will focus on the "smartness" of learning ecosystems to describe its multidimensional nature that defines a construct that goes well beyond the technological layer to include the wellbeing of all actors and stakeholders of the educational processes. With reference to the Italian schools we will illustrate also the framework that may support the implementation of learning ecosystems and, as well, that of concrete actions – examples will be provided – that could contribute to the increase of the "smartness" level of the ecosystems.

SPEAKER BIO

Graduated in Physics, he worked long time in solid state physics as expert of complex systems. Nowadays can be considered a 'Designer for the experience': expert in the technology-enhanced learning, interaction design, computer-mediated communication, design and management of processes, process and product innovation. Since 2015 is the President of ASLERD (Association for Smart Learning Ecosystems and Regional Development). Since 2013 till 2016 he has been the Scientific Director of the Creative Industries Area at the Consorzio Roma Ricerche. As member of ASLERD, he is engaged in the development of Smart Learning Ecosystems and is involved in projects focused on participatory evaluations and co-design of improvement plans, on the implementation of alternate schemes aimed at the development of LIFE and digital skills and on their micro-certification, on the technology support to the implementation of community pacts.

Future communication networks: Quantum, Post Shannon & Computing

Frank H. P. Fitzek
TU Dresden, Germany

ABSTRACT

Future communication systems will not only provide a novel architecture such as campus solutions or high altitude platforms, with three-dimensional networking, but also novel technologies such as the Post-Shannon theory and quantum communication in order to satisfy the upcoming demands for low latency communication and resilience.

SPEAKER BIO

Frank H. P. Fitzek is a Professor and head of the "Deutsche Telekom Chair of Communication Networks" at TU Dresden coordinating the 5G Lab Germany. He is the spokesman of the DFG Cluster of Excellence CeTI.

He received his diploma (Dipl.-Ing.) degree in electrical engineering from the University of Technology – Rheinisch-Westfälische Technische Hochschule (RWTH) – Aachen, Germany, in 1997 and his Ph.D. (Dr.-Ing.) in Electrical Engineering from the Technical University Berlin, Germany in 2002 and became Adjunct Professor at the University of Ferrara, Italy in the same year. In 2003 he joined Aalborg University as Associate Professor and later became Professor.

He co-founded several start-up companies starting with acticom GmbH in Berlin in 1999. He has visited various research institutes including Massachusetts Institute of Technology (MIT), VTT, and Arizona State University. In 2005 he won the YRP award for the work on MIMO MDC and received the Young Elite Researcher Award of Denmark. He was selected to receive the NOKIA Champion Award several times in a row from 2007 to 2011. In 2008 he was awarded the Nokia Achievement Award for his work on cooperative networks. In 2011 he received the SAPERE AUDE research grant from the Danish government and in 2012 he received the Vodafone Innovation prize. In 2015 he was awarded the honorary degree "Doctor Honoris Causa" from Budapest University of Technology and Economics (BUTE).

IEEE MELECON 2022 Conference Venue

MELECON 2022 will take place at the

University of Palermo – Dipartimento di Ingegneria
ADDRESS - Viale delle Scienze, Building 19
          90128, Palermo

Google Maps - Click on the link below
https://www.google.com/maps?ll=38.104744,13.350063&z=16&t=m&hl=it&gl=IT&mapclient
=embed&cid=5435523637560100612

The University of Palermo and its Dipartimento di Ingegneria will be hosting IEEE MELECON 2022. The modern building (number 19) contains several auditorium-like classrooms (see picture), each able to seat 100+ people and large common spaces for coffee breaks, lunch breaks and Exhibition.
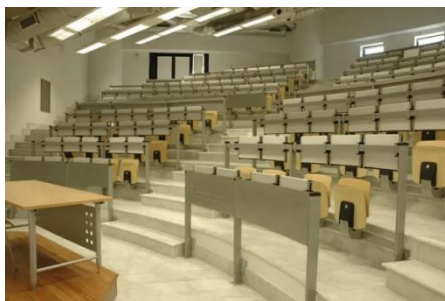
OPENING CEREMONY – WELCOME RECEPTION

The Opening Ceremony will take place at the **Aula Magna** of the main seat of the University of Palermo, located in the historic building **Palazzo Chiaramonte – Steri** – piazza Marina 59. The welcome reception will be organized in the same building.

IEEE MELECON 2022 Social Events

WELCOME RECEPTION

Tuesday, June 14, 2022
20:00 - 22:30

The MELECON 2022 Welcome Reception at the main seat of the University of Palermo, located in the historic building Palazzo Chiaramonte – Steri – piazza Marina 59.

GALA DINNER

Wednesday, June 15, 2022
20:00 – 23:30

The MELECON 2022 Gala Dinner will take place at Villa Chiaramonte Bordonaro.
ADDRESS: Via delle Croci, 21/A - Palermo

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TUESDAY, JUNE 14 2022

	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6
08:00 - 13:00	REGISTRATION					
09:00 - 10:30	Tutorial Track 1-1 Rosario Miceli	Tutorial Track 3-1 Valentina Corino	Tutorial on Ethics in Technology Ali Hessami	R8 Student Paper Contest		WORKSHOP: The EIRIE platform enabling R&I activities and investment in smart grids
10:30 - 11:00						
11:00 - 11:30	Coffee Break					
11:30 - 13:00	Tutorial Track 1-2 Pierluigi Mancarella	Tutorial Track 3-2 Manuela Ferrario	Tutorial Track 2-1 Giancarlo Fortino	Tutorial Track 4-1 Domenico Giustiniano & Mythri Hunukumbure		
13:00 - 15:00	Lunch + moving to Aula MAGNA					
	Aula MAGNA - Palazzo Steri					
15:00 - 16:30	Opening Session Plenary Speaker Alberto Sangiovanni Vincentelli					
16:30 - 18:30	Special meeting with industries					
18:30 - 19:30	Visit of Palazzo Steri					
20:00 - 22:30	Welcome Reception (Palazzo Steri)					

Program Schedule - Wednesday June 15

WEDNESDAY, JUNE 15 2022

	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6
08:30 - 10:30	Start up Video competition	TRACK 1A part 1 Energy storage systems and their control	TRACK 2A Artificial Intelligence, Augmented and Virtual Reality Keynote Domenico Formica	TRACK 3A Services, Applications and Solutions in Smart Healthcare	TRACK 4A 3D Networks Keynote Marco Di Renzo	TRACK 1D Electrical Machines and drivers for Industry Invited Hadi Kanaan
10:30 - 11:00	Exhibition		Coffee Break			
11:00 - 13:00	WIE event	TRACK 1A part 2 Energy storage systems and their control	TRACK 2B Modelling and Analysis of Advanced Products and Manufacturing Processes Invited Giambattista Gruosso	TRACK 3B - Nanostructured devices and smart materials for biophotonics applications Invited Zeev Zalevsky	TRACK 4B 5G and beyond Wireless Networks and Applications Invited Yuan Shen	TRACK 1E Electrical Machines and Electric Mobility
13:00 - 14:00			Lunch			
	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6
14:00 - 14:30	Special meeting on innovative start up & entrepreneurs- PANEL 1					
14:30 - 16:30		TRACK 1B Conversion and Control of Sustainable Energy Sources Keynote Kamal Al-Haddad		TRACK 3C part 1 Neural and Cognitive Engineering Invited Thomas Penzel	Track 4C part 1 Remote Sensing Methods and Applications	TRACK 1F The PSS and the EDS of Tokamak Experimental Facilities Invited Gian Mario Polli
16:30 - 17:00	Exhibition		Coffee Break			
17:00 - 18:30	Special meeting on innovative start up & entrepreneurs - PANEL 2	TRACK 1C Electrification of small islands & electric marine transportation Invited Giorgio Sulligoi	TRACK 2C Smart Materials & Smart Sensors for Industry 4.0	TRACK 3C part 2 Neural and Cognitive Engineering	Track 4C Part 2 Remote Sensing Methods and Applications	TRACK 4D Smart Education Technologies Invited Carlo Giovannella
20:00 - 23:30			Social Dinner & AWARDS			

Program Schedule - Thursday June 16

THURSDAY, JUNE 16

	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6
08:30 - 10:30	WIE/young student projects competition	TRACK 1J Cyber Security and Big Data Issues for Smart Grid Systems Keynote Seref Sagiroglu	TRACK 1G part 1 Smart solution for high penetration of PV generation in Renewable Energy Communities Invited Daniela Proto	TRACK 3D E-Health and IoT for Smart HealthCare Invited Massimo Mischi	TRACK 4E Part 1 Cognitive Computing, Artificial Intelligence & Machine Learning Keynote Mattia Rigotti	TRACK 1H Part 1 Energy Harvesting, Wireless Power transfer and Power Electronics Systems
10:30 - 11:00 — Exhibition			Coffee Break			
11:00 - 13:00	TRACK 1L Application of Machine Learning and Artificial Intelligence in Smart Grids Invited Tao Huang	TRACK 1K Part 1 Energy Management, Smart Metering and Distributed Energy Resources	TRACK 1G part 2 Smart solution for high penetration of PV generation in Renewable Energy Communities Invited Luigi Martirano	TRACK 3E Big Data Integration and Personalised Medicine Keynote Dimitrios Fotiadis	TRACK 4E Part 2 Cognitive Computing, Artificial Intelligence & Machine Learning	TRACK 1H Part 2 Energy Harvesting, Wireless Power transfer and Power Electronics Systems Invited Minh Nguyen
13:00 - 14:00			Lunch			
14:00 - 16:00	STUDENT & VP projects competition	TRACK 1K Part 2 Energy Management, Smart Metering and Distributed Energy Resources	TRACK 1M Part 1 Power Electronics and Control in Smart Grids, Industry and e-Transportation Invited Sheldon Williamson	TRACK 3F Advances in Medical Informatics for HealthCare Applications	TRACK 4F IoT and Smart Communications	TRACK 4G Smart Living Technologies Invited Frank Fitzek
16:00 - 16:30 — Exhibition			Coffee Break			
16:30 - 18:00			TRACK 1M Part 2 Power Electronics and Control in Smart Grids, Industry and e-Transportation	TRACK 3G -Bio-electromagnetic modelling		
18:00 - 18:30			Award Ceremony & CLOSING SESSION			

Technical Program - Tuesday, June 14

08:00 - 13:00
REGISTRATION
Room: University of Palermo - Dipartimento di Ingegneria - Building 19

09:00 - 11:00 CEST
TUTORIAL SESSION 1.1
Room: Room 1
Chair: Hadi Kanaan, *Saint-Joseph University of Beirut, Lebanon*

Challenges and Solutions for the Green Transition
Rosario Miceli, University of Palermo, Italy

09:00 - 11:00 CEST
TUTORIAL SESSION 3.1
Room: Room 2
Chair: Sergio Cerutti, *Politecnico di Milano, Italy*

The era of digital biomarkers in cardiovascular disease
Valentina Corino, Politecnico di Milano, Italy

09:00 - 11:00 CEST
TUTORIAL ON ETHICS IN TECHNOLOGY
Room: Room 3
Chair: Tiziana Tambosso, *IEEE R8 CoCSC Representative*

Recent Advances in the Assessment and Certification of AI Ethics
Ali Hessami, Chair & Technical Editor, IEEE 7000 Standard, Vice Chair and Process Architect,
IEEE Ethics Certification Program for Autonomous and Intelligent Systems

09:00 - 11:00 CEST
R8 STUDENT PAPER CONTEST
Room: Room 4
Chair: Vera Markovic, *University of Nis, Serbia*

09:00   **Optimization of Cold Rolling Process Recipes Based on Historical Data**
Kristjan Cuznar, University of Ljubljana, Jožef Stefan Institute, Slovenia
Miha Glavan, Jožef Stefan Institute, Slovenia

09:20   **Design of Low-Power Arithmetic Logic Circuits for 45 nm CMOS Technology**
Lorenzo Lagostina, Politecnico di Torino, Italy

09:40   **Beam-Switching Circularly Polarized Antenna Array for Cold-Chain Tracking RFID Applications**
Zixuan Huang, Imperial College London, United Kingdom

10:00   **Homomorphic Encryption for Privacy-Friendly Augmented Democracy**
Matthieu Brabant, University of Louvain, Belgium
Olivier Pereira, University of Louvain, Belgium
Pierrick Méaux, University of Luxembourg, Luxembourg

10:20   **Machine Learning as an Aid to Predicting Clinical Outcome After Stroke**
Emilija Cojbasic, University of Nis, Serbia

10:30 - 13:00 CEST
WORKSHOP - The EIRIE platform enabling R&I activities and investment in smart grids
Room: Room 6

Presentation of EIRIE's platform functionalities and discussion with stakeholders on the role of storage, e-mobility and policies to support the clean energy transition.

During the workshop the EIRIE multifunctional platform, developed by the PANTERA EU project (www.eirie.eu), will be presented and its main functionalities will be described in detail. EIRIE is meant to be a reference point for the EU Research & Innovation community by facilitating to search, find and share relevant results from EU projects thus supporting R&I activities and investments across Europe. Being the main focus of EIRIE the fields of smart grids, storage and local energy systems, two round tables will be dedicated to discussing with invited stakeholders from industry, academia and research organisations about the role of storage, e-mobility and energy policies in supporting the clean energy transition.

10:30 **Welcome and introduction**
Venizelos Efthymiou, PANTERA Coordinator – FOSS
Luciano Martini, EERA JP Smart Grids Coordinator - RSE

10:35 **The PANTERA project and the EIRIE platform**
Venizelos Efthymiou

10:50 **The EIRIE platform: demonstrative case studies**
V. Efthymiou and Kyriaki Psara, PANTERA Project

11:10 **KEYNOTE - The role of policies in supporting innovation uptake. How to capitalise results of R&I projects to foster innovation all around Europe**
Marcelo Masera (JRC)

11:25 **KEYNOTE - REPower EU: Analysis and implications on the Clean Energy Transition**
Adel El Gammal (EERA)

11:40 **ROUNDTABLE 1 - Storage and electromobility: a huge opportunity to enhance system flexibility. How to match grid and users' needs to foster renewables uptake**
Moderator: Kari Maki (VTT)
Panellists: Andrei Morch (SINTEF), Myriam Gil Bardaji (JP Energy Storage), Sebastian Martin (Univ. of Malaga), Graeme Burt (Univ. of Strathclyde)

12:15 **ROUNDTABLE 2 - The role of policies in fostering the deployment of innovative solutions. Recent development in citizen and renewable energy communities and how they could support local renewable sources exploitation**
Moderator: Andrei Morch (SINTEF)
Panellists: Stefano Raimondi (MITE), Eleonora Riva Sanseverino, (Univ. of Palermo - HEU), Rosaria Volpe (Univ. of Catania), Amedeo Buonanno (ENEA – eNeuron)

12:50 **Conclusions and Final Remarks**
Venizelos Efthymiou, Luciano Martini

11:00 - 11:30
COFFEE BREAK
Room: University of Palermo - Dipartimento di Ingegneria - Building 19

11:30 - 13:00 CEST
TUTORIAL SESSION 1.2
Room: Room 1
Chair: Gianfranco Chicco, *Politecnico di Torino, Italy*

Resilience in low-carbon grids [ON-LINE]

Pierluigi Mancarella, The University of Melbourne, Australia
The University of Manchester, UK

11:30 - 13:00 CEST
TUTORIAL SESSION 3.2
Room: Room 2
Chair: Sergio Cerutti, *Politecnico di Milano, Italy*

Cardiovascular parameters and monitoring systems for patients in intensive care unit

Manuela Ferrario, Politecnico di Milano, Italy

11:30 - 13:00 CEST
TUTORIAL SESSION 2.1
Room: Room 3
Chair: Sergio Rapuano, *IEEE Italy Section Chair*

Pushing Intelligence to the Edge of Internet of Things: A new Paradigm enabling Next-Generation Smart Systems of Systems

Giancarlo Fortino, University of Calabria, Italy

11:30 - 13:00 CEST
TUTORIAL SESSION 4.1
Room: Room 4
Chair: Barbara Masini, *National Research Council, Italy*

5G localization: from research to standardization

Domenico Giustiniano, IMDEA Networks
Mythri Hunukumbure, Samsung R&D, U.K.

13:00 - 15:00
LUNCH - MOVING TO PALAZZO STERI
Room: University of Palermo - Dipartimento di Ingegneria - Building 19

The Opening Ceremony will take place at the **Aula Magna** of the main seat of the University of Palermo, located in the historic building **Palazzo Chiaramonte - Steri - piazza Marina 59.**

15:00 - 16:30 CEST
OPENING SESSION
PLENARY SPEAKER
Room: Aula Magna - Palazzo Chiaramonte-Steri

The New Normal: The importance and the role of innovation
Alberto Sangiovanni-Vincentelli, University of California, Berkeley, USA

16:30 - 18:30 CEST
SPECIAL MEETING WITH INDUSTRIES
Room: Aula Magna - Palazzo Chiaramonte-Steri

16:30   **Introduction**
Dario Petri and Sergio Rapuano (IEEE Italy Section Chair)

16:35   **IEEE R8 Action for industry: challenges, opportunities, activities**
Danilo Pau (R8 Action for Industry Committee)

IEEE Italy Sections programs for industry
Dario Petri (IEEE Italy Section Industry Relationship Committee Chair)

16:50   **Real, virtual or distant: innovation in training**
Enrico Ragaini (ABB)

17:05   **Resource constrained machine learning: from micro controllers to in-sensor computing**
Danilo Pau (ST Microelectronics)

17:20   **Managing Complexity in Future Networks and Services**
Antonio Manzalini (TIM S.p.A.)

17:35   **Integrated e-Axle for 3rd generation BEV**
Alfredo Primon (Centro Ricerche FIAT – Stellantis)

17:50   **Speeding up the green transition of the IT's electricity system**
Temistocle Baffa Scirocco (Terna)

18:05   **Round table on "impact of COVID19/PNRR on your industry development strategies" and Q&A time**

18:30 - 19:30
VISIT OF PALAZZO CHIARAMONTE-STERI
Palazzo Chiaramonte-Steri

20:00 - 22:30
WELCOME RECEPTION
Palazzo Chiaramonte-Steri

08:00 - 18:00
REGISTRATION
Room: University of Palermo - Dipartimento di Ingegneria - Building 19

08:30 - 10:30 CEST
START UP VIDEO COMPETITION
Room: Room 1
Chair: Monica Guizzardi, *ARCA*

08:30 - 10:30 CEST
SESSION S1A - P1
Energy storage systems and their control - Part 1
Room: Room 2
Chairs: Andrea Mazza, *Politecnico di Torino, Italy*
Daniela Proto, *University of Naples Federico II, Italy*

08:30 **Soft-Start Capabilities of Battery Energy Storage Systems: Simulative Analysis of an Applicative Test-Case**
Roberto Aresi, Eletec2000 Srl, Italy
Andrea Bonfiglio, University of Genoa, Italy
Daniele Mestriner, University of Genoa, Italy
Giampiero Pace, Eletec2000 Srl, Italy
Paola Pongiglione, Hitachi Energy Spa, Italy
Ernesto Soressi, Hitachi Energy Spa, Italy

08:45 **Modelling and Evaluating Capability of Battery Storage Systems to Provide Extreme Event Services to the DSO: Case Study of Croatia**
Bojana Barać, University of Zagreb, Croatia
Matija Kostelac, University of Zagreb, Croatia
Ivan Pavić, University of Zagreb, Croatia
Tomislav Capuder, University of Zagreb, Croatia
Joško Grašo, Elektra Zagreb, Croatia
Anton Marušić, Elektra Zagreb, Croatia
Tomislav Koledić, Elektra Zagreb, Croatia
Josipa Barišin, Elektra Zagreb, Croatia

09:00 **Energy Storage Systems in DC Railways for Improving Operating Conditions of AC Power Grids** [ON-LINE]
Giuseppe Graber, University of Salerno, Italy
Vito Calderaro, University of Salerno, Italy
Vincenzo Galdi, University of Salerno, Italy
Lucio Ippolito, University of Salerno, Italy

09:15 **Preliminary Research on the Power Supply of a Real Industrial Load Through Load-Leveling Operation Strategy of Energy Storage System**
Michele De Santis, Università Nicolò Cusano, Italy
Luca Silvestri, Università Nicolò Cusano, Italy
Leonardo Federici, Università Niccolò Cusano, Italy

09:30 **Optimal Sizing of a Community Level Thermal Energy Storage System**
Mitch Geraedts, TU Delft, The Netherlands
Joel Alpízar-Castillo, TU Delft, The Netherlands
Laura Ramirez Elizondo, TU Delft, The Netherlands
Pavol Bauer, TU Delft, The Netherlands

09:45 **Vanadium Redox Flow Battery in Hybrid Propulsion Systems for Marine Applications**
Linda Barelli, University of Perugia, Italy
Michela Longo, Politecnico di Milano, Italy
Andrea Ottaviano, VGA srl, Italy
Dario Pelosi, University of Perugia, Italy
Dario Zaninelli, Politecnico di Milano, Italy
Federico Gallorini, VGA srl, Italy

10:00 **Option Value of EV Smart Charging Concepts in Transmission Expansion Planning Under Uncertainty**
Stefan Borozan, Imperial College London, United Kingdom
Spyros Giannelos, Imperial College, United Kingdom
Marko Aunedi, Imperial College London, United Kingdom
Goran Strbac, Imperial College London, United Kingdom

10:15 **Grey Wolf Optimisation for Maximising Benefits of Storage Devices in Distribution Systems**
Gianni Celli, University of Cagliari, Italy
Marco Galici, University of Cagliari, Italy
Maryam Mousavi, University of Cagliari, Italy
Fabrizio Pilo, University of Cagliari, Italy
Gian Giuseppe Soma, University of Cagliari, Italy

08:30 - 10:30 CEST
SESSION S2A
Artificial Intelligence, Augmented and Virtual Reality
Room: Room 3
Chair: Andrea Matta, *Politecnico di Milano, Italy*

08:30   **Edge-AI Platform for Realtime Wildlife Repulsion**
Marialaura Tamburello, University of Pisa, Italy
Giuseppe Caruso, University of Pisa, Italy
Stefano Giordano, University of Pisa, Italy
Davide Adami, CNIT Pisa Research Unit, University of Pisa, Italy
Mike Ojo, University of Torino, Torino, Italy

08:45   **Comparison of Hands-Free Speech-Based Navigation Techniques for Virtual Reality Training** [ON-LINE]
Davide Calandra, Politecnico di Torino, Italy
Filippo Gabriele Pratticò, Politecnico di Torino, Italy
Fabrizio Lamberti, Politecnico di Torino, Italy

09:00   **Extended Kalman Filter (EKF) Based Localization Algorithms for Mobile Robots Utilizing Vision and Odometry** [ON-LINE]
Hoang T. Tran, Duy Tan University, Vietnam
Thanh C. Vo, Duy Tan University, Vietnam
Dong LT. Tran, Duy Tan University, Vietnam
Quan NA. Nguyen, Duy Tan University, Vietnam
Duyen M. Ha, Duy Tan University, Vietnam
Quang N. Pham, Duy Tan University, Vietnam
Thanh Q. Le, Duy Tan University, Vietnam
Thang K. Nguyen, Duy Tan University, Vietnam
Hai T. Do, Thai Nguyen University of Technology, Vietnam
Minh T. Nguyen, Thai Nguyen University of Technology, Vietnam

09:15   **Embedded Image Capture System for Liquid Monitoring in the Smart Chemical Industry**
Nesrine Boussaada, ESTIA Bidart, France
Guillaume Terrasson, ESTIA, France
Alvaro Llaria, ESTIA, France
Octavian Curea, ESTIA, France

09:30   **Analysis of the Sentiments of the Participants in a Clinical Study to Evaluate a Balance Rehabilitation Intervention Delivered by a Virtual Coach** [ON-LINE]
Maria Roumpi, University of Ioannina, Greece

Dimitrios Gatsios, University of Ioannina, Greece
Vassilios Tsakanikas, University of Ioannina, Greece
Kostas M. Tsiouris, University of Ioannina, Greece
Eleni Georga, University of Ioannina, Greece
Doris Eva Bamiou, University College London, United Kingdom
Marousa Pavlou, King's College London, United Kingdom
Christos Nikitas, National Kapodistrian University of Athens, Greece
Dimitrios Kikidis, National Kapodistrian University of Athens, Greece
Isabelle Daniela Walz, University of Freiburg, Germany
Christoph Maurer, University of Freiburg, Germany
Dimitris Fotiadis, University of Ioannina, Greece

09:45   KEYNOTE - Robotics for human-human collaboration and sensorimotor augmentation Systems
Domenico Formica, Università Campus Bio-medico di Roma, Italy

08:30 - 10:15 CEST
SESSION S3A
Services, Applications and Solutions in Smart Healthcare
Room: Room 4
Chairs: Maria Gabriella Signorini, *Politecnico di Milano, Italy*
Fernando Vaquerizo-Villar, *Institute for Bioengineering of Catalonia, Spain*
Maurizio Naldi, *LUMSA University, Italy*

08:30   A Convolutional Neural Network to Classify Sleep Stages in Pediatric Sleep Apnea From Pulse Oximetry Signals
Fernando Vaquerizo-Villar, Universidad de Valladolid, Spain
Daniel Alvarez, Universidad de Valladolid, Spain
Gonzalo Gutiérrez-Tobal, Biomedical Engineering Group, Universidad de Valladolid, CIBER-BBN, Spain
Felix del Campo, Hospital Universitario Rio Hortega de Valladolid, Spain
Leila Kheirandish-Gozal, The University of Missouri School of Medicine, USA
David Gozal, The University of Missouri School of Medicine, USA
Thomas Penzel, Charité - Universitätsmedizin Berlin, Germany
Roberto Hornero, University of Valladolid, Spain

08:45   The Artificial Intelligence Based Diagnostic Assistant – AIDA [ON-LINE]
Azra Pašić, Budapest University of Technology and Economics, Hungary
Lejla Pašić, Budapest University of Technology and Economics, Hungary
Alija Pašić, Budapest University of Technology and Economics, Hungary

09:00 **Heal the Privacy: Functional Encryption and Privacy-Preserving Analytics**
Alexandros Bakas, Tampere University, Finland
Antonis Michalas, Tampere University, Finland

09:15 **The Uncertain Times of COVID Mass Vaccine Deliveries: From Start-Up to Steady-State**
Maurizio Naldi, LUMSA University, Italy
Gaia Nicosia, Università Roma Tre, Italy
Andrea Pacifici, Università di Roma "Tor Vergata", Italy

09:30 **A Model to Improve the Quality of Low-Dose CT Scan Images**
Francesca Chircop, University of Malta, Malta
Carl J. Debono, University of Malta, Malta
Paul Bezzina, University of Malta, Malta
Francis Zarb, University of Malta, Malta

09:45 **PDapp: A Companion Mobile Application With Appcessories for Continuous Follow-Up of Parkinson's Disease Patients**
Duarte Dias, INESC TEC, Portugal
Joana M Silva, Previous Member of INESC Technology and Science, Portugal
Nuno Oliveira, Dengun, Portugal
João Massano, Centro Hospitalar Universitário de São João, University of Porto, Portugal
João Paulo S. Cunha, INESC TEC, University of Porto, Portugal

10:00 **Typical External Loads That Require to Be Resisted by a Non-Dominant Prosthetic Hand**
Yesenia Aquilina, University of Malta, Malta
Michael A. Saliba, University of Malta, Malta
Jesmond Attard, University of Malta, Malta
Alexiei Dingli, University of Malta, Malta

08:30 - 10:15 CEST
SESSION S4A
3D Networks
Room: Room 5
Chairs: Barbara Masini, *CNR-IEIIT, Italy*
Franco Davoli, *University of Genoa and CNIT S2N National Lab, Italy*
Mario Marchese, *University of Genoa and CNIT S2N National Lab, Italy*
Ana Perez-Neira, *Centre Tecnològic Telecomunicacions Catalunya, Spain*

08:30 **Power and Bandwidth Allocation Based on Age of Information Metrics in Satellite Uplink Channels**
Jorge Torres Gomez, TU Berlin, Germany
Máximo Morales-Céspedes, Universidad Carlos III de Madrid, Spain
Musbah Shaat, Centre Tecnològic de Telecomunicacions de Catalunya, Spain
Ana Isabel Pérez Neira, UPC/CTTC, Spain
Ana Garcia Armada, Universidad Carlos III de Madrid, Spain

08:45 **NS-3-Based 5G Satellite-Terrestrial Integrated Network Simulator**
Nour Badini, University of Genoa, Italy
Mario Marchese, University of Genoa, Italy
Fabio Patrone, University of Genoa, Italy

09:00 **Over the Air Computing for Satellite Networks in 6G**
Marc M. Gost, Universitat Politecnica de Catalunya, Centre Tecnologic de Telecomunicacions de Catalunya, Spain
Ana Pérez-Neira, , Universitat Politecnica de Catalunya, Centre Tecnologic de Telecomunicacions de Catalunya, Spain

09:15 **Federated Semi-Supervised Classification of Multimedia Flows for 3D Networks**
Saira Bano, University of Pisa, ISTI-CNR, Italy
Achilles Machumilane, University of Pisa, ISTI-CNR, Italy
Lorenzo Valerio, CNR, Institute of Informatics and Telematics, Italy
Pietro Cassarà, CNR, Institute of Information Science and Technologies, Italy
Alberto Gotta, CNR, Institute of Information Science and Technologies, Italy

09:30 **KEYNOTE - Reconfigurable Intelligent Surfaces for Wireless Communications**
Marco Di Renzo, CNRS & Paris-Saclay University

08:30 - 10:30 CEST
SESSION S1D
Electrical Machines and Drivers for Industry
Room: Room 6
Chairs: Giorgio Sulligoi, *University of Trieste, Italy*
Sobhan Mohamadian, *School of Engineering, Damghan University, Iran*
Daniele Bosich, *University of Trieste, Italy*

08:30 **Robust Control Based on Variable Structure of a Symmetrical Six Phase PMSM for Wind Turbine** [ON-LINE]

Omar Bouyahia, University of Picardie Jules Verne, France
Franck Betin, University of Picardie Jules Verne, France
Amine Yazidi, University of Picardie Jules Verne, France

08:45 **A Theoretical Analysis of the Direct Flux Control Technique for Inter-Turns Short-Circuits in PMSMs**

Fabio Corti, University of Perugia, Italy
Marco Pratelli, University of Florence, Italy
Francesco Grasso, University of Florence, Italy
Matthias Nienhaus, Saarland University, Germany
Emanuele Grasso, Saarland University, Germany

09:00 **Combined Grid Inertia Contribution and Mechanical Active Damping Control for Variable Speed Wind Turbines**

Katharina Günther, Ruhr University Bochum, Germany
Constantinos Sourkounis, Ruhr University Bochum, Germany

09:15 **Air-Gapped Current Transformer Simulation and Accuracy Assessment** [ON-LINE]

Luis Felipe Ceron Oliver, Durham University, United Kingdom
Qing Wang, Durham University, United Kingdom
Dagou Zeze, Durham University, United Kingdom

09:30 **Torque Control of DC Electric Motor Using PID-Genetic Algorithm Optimization Method**

Mohamed Benchagra, University Sultane Moulay Slimane, Morocco

09:45 **Discrimination Between Broken Bars Fault and Load Torque Variation in Induction Motors** [ON-LINE]

Faiza Ouiddir, USTO-MB, Algeria
Noureddine Benouzza, USTO-MB, Algeria

10:00 **INVITED - Advanced Grid-Connected Power Electronics for Power Quality**

Hadi Kanaan, Saint-Joseph University of Beirut, Lebanon

10:30 - 11:00
COFFEE BREAK
Room: University of Palermo - Dipartimento di Ingegneria - Building 19

11:00 - 13:00 CEST
WIE EVENT
THE VISION OF THE INDUSTRY ON DIGITAL EVOLUTION IN HER WORDS
Room: Room 1
Abstracts and Speakers' biographies are available HERE

11:00   **Welcome**
Dajana CASSIOLI, Chair of the WIE AG IEEE Italy Section
Simay AKAR, Vice-Chair of the Student Activities of IEEE R8, past chair of the WIE IEEE R8

11:10   **Track 1: Smart Energy**
The energy transition: sustainable, digital and equal
Ambra SANNINO, Head of Department of Power Systems Planning for the Northern Europe region – DNV, Norway

11:25   **Track 2: Smart Industry**
Smart Industries: Tomorrow Reimagined
Manuela TACCIA, General Manager at Emerson, Italy

11:40   **Track 3: Smart HealthCare**
When Medicine met Technology: A long love story
Blanca JORDAN, Head of the Renal IT Department of Fresenius Medical Care, Spain

11:55   **Track 4: Smart Digital Communities**
The Carbon offsets verification dilemma and the next generation digital solutions for MRV
Nahla SALEM, Marketing Manager at 17tons, Italy

12:10   **Opening and Interactive Session**
(www.menti.com)
Chair - Patrizia Lamberti, Vice-Chair of the WIE AG IEEE Italy Section

12:30   **Live Panel Discussion**
with Ambra SANNINO, Manuela TACCIA, Blanca JORDAN, Nahla SALEM, Dajana CASSIOLI, Simay AKAR
Moderator – Cristina PONTI, Roma Tre University, Member of the WIE AG IEEE Italy Section

12:45   **Closing Interactive Session**
Chair - Patrizia Lamberti, Vice-Chair of the WIE AG IEEE Italy Section

11:00 - 13:00 CEST
SESSION S1A - Part 2
Energy storage systems and their control - Part 2
Room: Room 2
Chairs: Andrea Mazza, *Politecnico di Torino, Italy*
Daniela Proto, *University of Naples Federico II, Italy*

11:00 **Statistical Approach for Continuous Internal Resistance Estimation of Lithium Ion Cells Under Dynamic Loads**
Avdyli Arber, Mercedes Benz AG, Germany
Alexander Fill, University of Stuttgart, Germany
Kai Peter Birke, University of Stuttgart, Germany

11:15 **Interaction of Temperature and Current Differences Among Parallel-Connected Lithium-Ion Cells in Dependency of the Thermal Battery Design**
Alexander Fill, University of Stuttgart, Germany
Kai Peter Birke, University of Stuttgart, Germany

11:30 **Optimal Bidding for a Large Battery-Electrolyzer Facility in the Day-Ahead Market**
Petra Miljan, University of Zagreb, Croatia
Zeljko Tomsic, University of Zagreb, Croatia
Hrvoje Pandzic, University of Zagreb, Croatia

11:45 **Comparative Evaluation of Ramp-Rate Limitation Control Strategies Employing Supercapacitors**
Kyriaki-Nefeli Malamaki, Aristotle University of Thessaloniki, Greece
Georgios Kryonidis, Aristotle University of Thessaloniki, Greece
Charis Demoulias, Aristotle University of Thessaloniki, Greece

12:00 **Provision of Ancillary Services by Wind Generators With Energy Storage Systems: A Real Italian Case-Study** [ON-LINE]
Fabrizio De Caro, University of Sannio, Italy
Antonio Pepiciello, University of Sannio, Italy
Alfredo Vaccaro, University of Sannio, Italy

12:15 **Environmental and Economic Issues for the Sizing of Battery Energy Storage Combined With Renewable Generation in an Industrial Facility**
Fabio Mottola, University of Naples Federico II, Italy
Daniela Proto, University of Naples Federico II, Italy
Marco Russo, University of Naples Federico II, Italy

12:30   **Consumer, Producer, and Prosumer Based Mathematical Models for Optimal Energy Storage Sizing**
Semanur Sancar, Ozyegin University, Turkey
Gokturk Poyrazoglu, Ozyegin University, Turkey

12:45   **Impact of Flexibility Services Implementation on Power Network Constraint Management**
Carlos Cruzat, RINA Tech UK Ltd, United Kingdom
Karim Anaya, University of Cambridge, United Kingdom
Michael Pollitt, University of Cambridge, United Kingdom
Rhys Williams, SSEN, United Kingdom

11:00 - 13:00 CEST
SESSION S2B
Modelling and Analysis of Advanced Products and Manufacturing Processes
Room: Room 3
Chair: Francesco Masulli, *University of Genoa, Italy*

11:00   **INVITED - Digital Twins Paradigm: the Industry 4.0 way for the Simulation and Modelling**
Giambattista Gruosso, Politecnico di Milano, Italy

11:30   **Net-Zero Energy Factory: Exploitation of Flexibility - A Technical-Economic Analysis for a German Carpentry**
Pio Lombardi, Fraunhofer Institute for Factory Operation and Automation, Germany
Marco Liserre, Christian-Albrechts-Universität zu Kiel, Germany

11:45   **Pareto Front Analysis of Buffer-Based Energy Efficient Control for Machines in Serial Flow Lines**
Nicla Frigerio, Politecnico di Milano, Italy
Andrea Matta, Politecnico di Milano, Italy
Ziwei Lin, Shanghai Jiao Tong University, China

12:00   **Thevenin-Based Battery Model With Ageing Effects in Modelica** [ON-LINE]
Roman Milishchuk, Ukrainian Catholic University, Ukraine
Tetiana Bogodorova, Rensselaer Polytechnic Institute, USA

12:15   **Modelling and Analysis of Radiation Heating in Thermoforming Processes**
Enrico Spateri, Politecnico di Milano, Italy
Fredy Ruiz, Politecnico di Milano, Italy
Giambattista Gruosso, Politecnico di Milano, Italy

12:30   **A Deep Transfer Learning Approach to an Effective Classification of Water Pollutants From Voltammetric Characterizations** [ON-LINE]
Mario Molinara, University of Cassino and Southern Lazio, Italy
Luigi Ferrigno, University of Cassino and Southern Lazio, Italy
Antonio Maffucci, University of Cassino and Southern Lazio, INFN-LNF, Italy
Polina Kuzhir, University of Eastern Finland, Finland
Rocco Cancelliere, University of Rome Tor Vergata, Italy
Alessio Di Tinno, University of Rome Tor Vergata, Italy
Laura Micheli, University of Rome Tor Vergata, Italy
Mikhail Shuba, Belarusian State University, Belarus

12:45   **Learning Factories: A Review of State of the Art and Development of a Morphological Model for an Industrial Engineering Education 4.0** [ON-LINE]
Mara Bellucci, University of Calabria, Italy
Alessandro Chiurco, University of Calabria, Italy
Antonio Cimino, University of Salento, Italy
Domenica Ferro, University of Calabria, Italy
Francesco Longo, University of Calabria, Italy
Antonio Padovano, University of Calabria, Italy

11:00 - 12:45 CEST
SESSION S3B
Nanostructured devices and smart materials for biophotonics applications
Room: Room 4
Chairs: Antonio d'Alessandro, *Sapienza University of Rome, Italy*
Stefan G. Stanciu, *Universitatea Politehnica of Bucharest, Romania*

11:00   **INVITED - Machine learning based non-invasive bloodstream glucose monitoring via multimode optical fiber sensor**
Zeev Zalevsky, Bar-Ilan University, Israel

11:30   **Refractive Index Sensing by a Silicon Metasurface**
Davide Rocco, Università degli Studi di Brescia, Italy
Andrea Tognazzi, University of Palermo, Italy
Marco Gandolfi, Università degli Studi di Brescia, Italy
Luca Carletti, Università degli Studi di Brescia, Italy
Costantino De Angelis, Università degli Studi di Brescia, Italy
Andrea Locatelli, Università degli Studi di Brescia, Italy
Alfonso Carmelo Cino, University of Palermo, Italy

11:45 **Micron-Sized Bioparticles Detection Through Phase Analysis of Back-Scattering Signals From Optical Fiber Tweezers: An Exploratory Study**
Beatriz Jacinto Barros, INESC TEC, Portugal
João Paulo S. Cunha, INESC TEC and FEUP, Portugal

12:00 **Biocompatibility of Integrated Nanostructure for IC Electronics Devices**
Roberto Gaetani, Sapienza University of Rome, Italy
Yuriy Derevyanchuk, Sapienza University of Rome, Italy
Elisa Messina, Sapienza University of Rome, Italy
Andrea Notargiacomo, National Research Council, Italy
Marialilia Pea, National Research Council, Italy
Massimiliano Renzi, Sapienza University of Rome, Italy
Fabrizio Palma, Sapienza University of Rome, Italy

12:15 **Characterization of All-Dielectric Metasurfaces Using Space-Limited Model**
[ON-LINE]
Sharmetha Kannan, Sapienza University of Rome, Italy
Fabio Mangini, University of Brescia, Italy
Aniqa Mehboob, Sapienza University of Rome, Italy
Fabrizio Frezza, Sapienza University of Rome, Italy

12:30 **Exploring the Temperature-Dependent Goos-Hänchen Shift on the Metal Surface** [ON-LINE]
Aniqa Mehboob, Sapienza University of Rome, Italy
Fabio Mangini, University of Brescia, Italy
Fabrizio Frezza, Sapienza University of Rome, Italy

11:00 - 12:45 CEST
SESSION S4B
5G and beyond Wireless Networks and Applications
Room: Room 5
Chairs: Francesco Guidi, *CNR-IEIIT, Italy*
Ahmed Elzanaty, *University of Surrey, UK*

11:00 **INVITED - A Spatio-Temporal Signal Dimension Reduction Method for Integrated Localization and Sensing** [ON-LINE]
Yi Li, Tsinghua University, China
Hanying Zhao, Tsinghua University, China
Yuan Shen, Tsinghua University, China

11:30   **Joint Communication and Sensing in 5G-V2X Vehicular Networks**
Nicolò Decarli, CNR-IEIIT and CNIT, Italy
Stefania Bartoletti, CNR-IEIIT and CNIT, Italy
<u>Barbara M Masini, CNR-IEIIT and CNIT, Italy</u>

11:45   **Automatic Backhaul Planning for 5G Open RAN Networks Based on MNO Data**
Beatriz Marques, Instituto Superior Técnico (IST), Portugal
Diogo Parracho, Instituto de Telecomunicações and CELFINET and ISEL, Portugal
<u>Marco Sousa, Instituto de Telecomunicações and Celfinet, Portugal</u>
Pedro Vieira, Instituto de Telecomunicações / ISEL, Portugal
Maria Paula Queluz, Instituto Superior Técnico, Portugal
António J. Rodrigues, Instituto Superior Técnico, Portugal

12:00   **Deep Learning to Robustify a Geometric Interpretation of Trilateration for 3D RSS-Based Localization**
Minh Hoang Le, EURECOM, Orange Labs, France
<u>Dirk Slock, EURECOM, France</u>
Jean-Pierre Rossi, Orange Labs, France

12:15   **Cognitive Waveforms for Automotive Radar**
<u>Mario La Manna, Evoelectronics, Italy</u>
Marco La Manna, KMB Telematics, USA

12:30   **Design, Simulation and Testing of a Fast Recharge System for Public Transportation System**
Adriano Alessandrini, University of Florence, Italy
Lorenzo Berzi, University of Florence, Italy
Tommaso Favilli, University of Florence, Italy
Domenico Staffa, University of Florence, Italy
Antonino Genovese, ENEA, Italy
<u>Luca Pugi, University of Florence, Italy</u>
Fabio Cignini, ENEA, Italy
Fernando Ortenzi, ENEA, Italy

11:00 - 13:00 CEST
SESSION S1E
Electrical Machines and Electric Mobility
Room: Room 6
Chairs: Massimo Caruso, *University of Palermo, Italy*
         Daniele Bosich, *University of Trieste, Italy*

11:00   A Fuzzy Controlled Pitch Angle in a Permanent Magnet Synchronous Generator Type Wind Energy Conversion System [ON-LINE]

Demsew Mitiku Teferra, Pan-African University, Kenya
Livingstone M.H.Ngoo, Multimedia University, Kenya
George N. Nyakoe, University Agriculture and Technology, Kenya

11:15   Applicability Verification of the Magnetic Geared Motor for Railway Vehicle Traction

Seong-Hwi Kim, Hanyang University, Korea
Jae Hyeon Lim, Korea National University of Transportation, Korea
Seong-Yong Hong, Korea National University of Transportation, Korea
Jin Chul Kim, Korea National University of Transportation, Korea
Jae Bum Lee, Korea National University of Transportation, Korea
Hyung Woo Lee, Korea National University of Transportation, Korea
Chan Bae Park, Korea National University of Transportation, Korea

11:30   A Data-Driven Model for Fault Diagnosis of Induction Motor for Electric Powertrain [ON-LINE]

Hicham El Hadraoui, Mohammed VI Polytechnic University, Morocco
Oussama Laayati, Hassan I University, Morocco
Nasr Guennouni, Mohammed VI Polytechnic University, Morocco
Ahmed Chebak, Mohammed VI Polytechnic University, Morocco
Mourad Zegrari, Université Hassan II Casablanca, Morocco

11:45   Anti-Icing System on Railway Turnouts Using Induction Heating Technology for Energy Saving

Hyeong-Seok Oh, Hanyang University, Korea
Dong Kyun Kim, Korea National University of Transportaion, Korea
Seok-Min Hong, Korea National University of Transportaion, Korea
Sang Gyun Ryu, Korea National University of Transportaion, Korea
Chan Bae Park, Korea National University of Transportaion, Korea
Jae Bum Lee, Korea National University of Transportaion, Korea
Ju Lee, Hanyang University, Korea
Hyung Woo Lee, Korea National University of Transportaion, Korea

12:00   Effect of Static Eccentricity on the Mean Values of the Inductances of PMSMs

Carsten Klein, Saarland University, Germany
Marco Palmieri, Politecnico di Bari, Italy
Matthias Nienhaus, Saarland University, Germany
Emanuele Grasso, Saarland University, Germany

12:15 **Design, Optimization and Experimental Study of Axial and Hub BLDC Motors In-Wheel Application for Light Electric Vehicles** [ON-LINE]
Kenan Toker, Marmara University, Turkey
Ozturk Tosun, Marmara University, Turkey
Necibe Fusun Serteller, Marmara University, Turkey
Vedat Topuz, Marmara University, Turkey

12:30 **Backstepping-Based Control of Vienna Rectifier for Electric Vehicle DC Ultra-Fast Charger** [ON-LINE]
Achraf Saadaoui, Mohammed V University in Rabat, Morocco
Mohammed Ouassaid, Mohammed V University in Rabat, Morocco
Mohamed Maaroufi, Mohammed V University in Rabat, Morocco

12:45 **Effect of V2G Technology Integration on MV Distribution Grids**
Francesca Marasciuolo, Politecnico di Bari, Italy
Maria Dicorato, Politecnico di Bari, Italy
Giuseppe Forte, Politecnico di Bari, Italy
Pasquale Montegiglio, Politecnico di Bari, Italy

13:00 - 14:00
LUNCH
Room: University of Palermo - Dipartimento di Ingegneria - Building 19

14:00 - 16:30 CEST
SPECIAL MEETING ON INNOVATIVE START UP & ENTREPRENEURS - PANEL 1
Room: Room 1
Abstracts and Speakers' biographies are available HERE

14:00 **Welcome to participants**
Tiziana Tambosso – IEEE Italy Section Entrepreneurship Committee
Vincenzo Piuri – IEEE R8 Director-Elect
Monica Guizzardi – ARCA

Panel 1: Entrepreneurship – how to start an innovative startup
Moderator: Tiziana Tambosso & Vincenzo Piuri

14:15 **Ethical Artificial Intellicence: added value and impact of ethics in development and adoption of AI technologies**
Alfredo Milani, University of Perugia, Italy

14:35   **IEEE programs to support entrepreneurships**
Mohamed El Dallal, IEEE Entrepreneurship Committee & R8 Entrepreneurship Initiative

14:55   **Health Technology Innovation: from idea to adoption**
Shanshan Zhou, ARCA

15:15   **From university spin off to a successful start up**
Massimiliano Oliveri, ARCA

15:35   **Venture Capital approach to early stage financing: an overview**
Roberto della Marina, Venture Factory

15:55   **Q&A & Round table**

14:30 - 16:30 CEST
SESSION S1B
Conversion and Control of Sustainable Energy Sources
Room: Room 2
Chairs: Kamal Al-Haddad, University of Montreal, Canada
Massimo La Scala, Politecnico di Bari, Italy

14:30   **KEYNOTE - New Challenges for Power Electronics Converters to Reach Filter Less Operation** [ON-LINE]
Kamal Al-Haddad, University of Montreal, Canada

15:00   **Optimal Allocation of Protection and Control Devices in Distribution Networks With Microgrids**
Cleberton Reiz, São Paulo State University, Brazil
Tayenne de Lima, São Paulo State University, Brazil
Jonatas Leite, São Paulo State University, Brazil
Mohammad Javadi, INESC TEC Porto, Portugal
Clara Gouveia, INESC TEC Porto, Portugal

15:15   **Social and Environmental Impacts Linked to the Use of Non-Destructive Methods in Installations of Underground Electricity Networks** [ON-LINE]
Maileen S Simão, CERTI Foundation, Brazil
Beatriz B Cardoso, CERTI Foundation, Brazil
Euler Ribeiro, CERTI Foundation, Brazil
Marcos Aurelio Izumida Martins, CERTI Foundation, Brazil
Moacir F Lopes Jr., Enel Distribuição São Paulo, Brazil

15:30   **Economic Dispatch Problem Solution via Holomorphic Embedding Method**
Ana Catarina Salles Ramos, University of Palermo, Italy
Francisco Damasceno Freitas, Universidade de Brasilia, Brazil

15:45   **Climate Change Mitigation in Cities by Adopting Solar Streetlights With Energy Management Capabilities: Case of Nairobi**
Willy Stephen Tounsi Fokui, Pan African University, Kenya
Michael Saulo, Technical University of Mombasa, Kenya
Livingstone Ngoo, Multimedia University of Kenya, Kenya

16:00   **A Dual Function of Buck-Boost Converter in Photovoltaic System: MPP Tracker and I-V Tracer for Fault Diagnosis Applictions** [ON-LINE]
Yassine Chouay, Mohammed V University in Rabat, Morocco
Mohammed Ouassaid, Mohammed V University in Rabat, Morocco

16:15   **Hybrid PV-Wind-Battery Management System Based on 7L Switched-Capacitor MLI** [ON-LINE]
Abdelbasset Mehiri, National Polytechnics School, Algeria
El Madjid Berkouk, National Polytechnic School of Algiers, Algeria
Saad Mekhilef, Swinburne University of Technology, Australia

14:30 - 16:30 CEST
SESSION S3C - P1
Neural and Cognitive Engineering - Part 1
Room: Room 4
Chairs: Anna Maria Bianchi, *Politecnico di Milano, Italy*
Patricia Figuereido, *Istituto Superior Tecnico, Portugal*

14:30   **INVITED - The future of sleep medicine for biomedical engineering**
Thomas Penzel, Scientific Chair of the Interdisciplinary Center of Sleep Medicine

15:00   **A Quick Review on Machine Learning Techniques in Code Comprehension and Code Review Estimated by Neurophyisolgical Data**
Haytham Hijazi, University of Coimbra, Portugal
Ricardo Couceiro, University of Coimbra, Portugal
Joao Castelhano, University of Coimbra, CIBIT/ICNAS, Portugal
Miguel Castelo-Branco, University of Coimbra, Portugal
Paulo Carvalho, University of Coimbra, Portugal
Henrique Madeira, University of Coimbra, Portugal

15:15   **Intelligent Biofeedback Comprehension Assessment: Theory, Research, and Tools**
Haytham Hijazi, University of Coimbra, Portugal
Ricardo Couceiro, University of Coimbra, Portugal
Joao Castelhano, University of Coimbra, CIBIT/ICNAS, Portugal
José Cruz, University of Coimbra, Portugal
Miguel Castelo-Branco, University of Coimbra, Portugal
Paulo Carvalho, University of Coimbra, Portugal
Henrique Madeira, University of Coimbra, Portugal

15:30   **EEG Analysis of Selective Attention During Error Potential BCI Experiments**
Andrea Farabbi, Politecnico di Milano, Italy
Luca Mainardi, Politecnico di Milano, Italy

15:45   **NeuXus: A Biosignal Processing and Classification Pipeline for Real-Time Brain-Computer Interaction**
Simon Legeay, Université Paris-Saclay, France, Universidade de Lisboa, Portugal
Gustavo Caetano, Instituto Superior Técnico, Universidade de Lisboa, Portugal
Patrícia Figueiredo, Instituto Superior Técnico, Universidade de Lisboa, Portugal
Athanasios Vourvopoulos, Instituto Superior Técnico, Universidade de Lisboa, Portugal

16:00   **Epileptic Seizure Classification Using Combined Labels and a Genetic Algorithm**
Scot Davidson, Ulster University, United Kingdom
Niamh Mccallan, Ulster University, United Kingdom
Kok Yew Ng, Ulster University, United Kingdom
Pardis Biglarbeigi, Ulster University, United Kingdom
Dewar Finlay, Ulster University, United Kingdom
Boon Leong Lan, Monash University, Malaysia
James Mclaughlin, Ulster University, United Kingdom

16:15   **Assessment of Muscle Fatigue During the Walk on a Treadmill in Healthy Subjects Based on Median Frequency of Surface Electromyogram**
Szymon Siecinski, Silesian University of Technology, Poland
Paweł Kostka, Silesian University of Technology, Poland
Ewaryst Janusz Tkacz, Silesian University of Technology, Poland

14:30 - 16:15 CEST
SESSION S4C - P1
Remote Sensing Methods and Applications - Part 1
Room: Room 5
Chairs: Gloria Bordogna, *CNR-IREA, Italy*
Dino Ienco, *INRAE, UMR TETIS, France*

14:30 Introduction to Remote Sensing Methods: Open Issues and New Challenges
Gloria Bordogna, CNR-IREA, Italy

14:45 Joint Use of Airborne LiDAR Metrics and Topography Information to Estimate Forest Parameters via Neural Networks
Kamel Lahssini, INRAE, Univ. Montpellier, France
Karun Reuel Dayal, INRAE, Univ. Montpellier, France
Sylvie Durrieu, INRAE, Univ. Montpellier, France
Jean-Matthieu Monnet, INRAE, Univ. Grenoble Alpes, France

15:00 Spaceborne SAR Remote Sensing for Hydrogeological Risk Monitoring
Simona Verde, CNR-IREA, Italy
Diego Reale, CNR-IREA, Italy
Antonio Pauciullo, CNR-IREA, Italy
Eugenio Sansosti, CNR-IREA, Italy
Gianfranco Fornaro, CNR-IREA, Italy

15:15 The VIIRS Nighttime Lights Average Annual Global Dataset: Exploratory and Brisk Trend Analysis on Three Different Domains
Andrea Ajmar, Politecnico di Torino, Italy
Emere Arco, Politecnico di Torino, Italy
Allegra Eusebio, Politecnico di Torino, Italy

15:30 Automatic Generation of Sentinel-1 DInSAR Co-Seismic Maps at Global Scale
Mario Fernando Monterroso, CNR-IREA, Italy
Manuela Bonano, CNR-IMAA, Italy
Claudio De Luca, CNR-IREA, Italy
Riccardo Lanari, CNR-IREA, Italy
Michele Manunta, CNR-IREA, Italy
Mariarosaria Manzo, CNR-IREA, Italy
Giovanni Onorato, CNR-IREA, Italy
Ivana Zinno, CNR-IREA, Italy
Francesco Casu, CNR-IREA, Italy

15:45   **Comparing Machine Learning Techniques for Aquatic Vegetation Classification Using Sentinel-2 Data**
Erika Piaser, National Research Council, Italy
Paolo Villa, National Research Council, Italy

16:00   **Explainable Multi-Criteria Data-Driven Environmental Status Assessment From Remote Sensing**
Daniela Stroppiana, CNR-IREA, Italy
Mirco Boschetti, CNR-IREA, Italy
Pietro Alessandro Brivio, CNR-IREA, Italy
Gloria Bordogna, CNR-IREA, Italy

14:30 - 16:30 CEST
SESSION S1F
The PSS and the EDS of Tokamak Experimental Facilities
Room: Room 6
Chairs: Gianmario Polli, *ENEA-DTT, Italy*
Pietro Zito, *ENEA Research Center Frascati, Italy*

14:30   **INVITED - Status of Design and Procurement Activities in DTT Tokamak Project Area**
Gian Mario Polli, ENEA, Italy
Antonio Cucchiaro, DTT S. c. r. l., Italy
Mauro Dalla Palma, Consorzio RFX, Italy
Lori Gabellieri, ENEA and DTT S. c. a r. l., Italy
Alessandro Lampasi, ENEA, Italy
Giuseppe Ramogida, ENEA, Italy
Andrea Reale, ENEA and DTT S. c. a r. l., Italy
Selanna Roccella, ENEA, Italy
Marco Valisa, RFX Consortium, Italy

15:00   **Model Predictive Control for Tokamak Central Solenoid Power Supply**
Cristina Terlizzi, University of Rome Tor Vergata, Italy
Stefano Bifaretti, University of Rome Tor Vergata, Italy
Alessandro Lampasi, ENEA, Italy

15:15   **Guidelines and Conceptual Design of the Grounding System of the DTT Experimental Facility** [ON-LINE]
Carmelo Riccardo Lopes, University of Palermo & ENEA, Italy
Cristina Terlizzi, University of Rome Tor Vergata, Italy
Roberto Romano, ENEA & DTT, Italy

Guido Ala, Università degli Studi di Palermo, Italy
Gaetano Zizzo, University of Palermo, Italy
Pietro Zito, ENEA & DTT, Italy
Stefano Bifaretti, C-PED, Center for Power Electronics and Drive, University of Rome Tor Vergata, Italy
Vincenzo Bonaiuto, Tor Vergata University of Rome, Italy
Alessandro Lampasi, ENEA & DTT, Italy

15:30 **Transmitter and HVPS Architectures in the Ion-Cyclotron Radio Frequency System of DTT** [ON-LINE]
Sebastian N Piras, University of Rome Tor Vergata, ENEA, Italy
Stefano Bifaretti, University of Rome Tor Vergata, Italy
Silvio Ceccuzzi, ENEA, DTT S.c. a r.l., Italy
Gianluca Ravera, Fusion and Nuclear Safety Department, ENEA, Italy

15:45 **Progress in the Design of the DTT Electrical Distribution System** [ON-LINE]
Marzia Caldora, Sapienza University of Rome, Italy
Gabriele Greco, Tuscia University, Italy
Roberto Romano, ENEA & DTT, Italy
Simone Minucci, University of Tuscia, Italy
Alessandro Lampasi, ENEA, Italy
Maria Carmen Falvo, Sapienza University of Rome, Italy

16:00 **Single-Phase Inverter Evaluation for a Tokamak Non-Axisymmetric In-Vessel Coil Power Supply**
Giovanni Griva, Politecnico di Torino, Italy
Salvatore Musumeci, Politecnico di Torino, Italy
Radu Bojoi, Politecnico di Torino, Italy
Alessandro Lampasi, ENEA, Italy
Pietro Zito, ENEA, Italy
Stefano Bifaretti, University of Rome Tor Vergata, Italy

16:15 **Power Supply Systems for the DTT Superconducting Magnets**
Alessandro Lampasi, ENEA, Italy
Carmelo Riccardo Lopes, University of Palermo, Italy
Matteo Manganelli, ENEA, Italy
Sabino Pipolo, ENEA, Italy
Pietro Zito, ENEA, Italy

16:30 - 17:00
COFFEE BREAK
Room: University of Palermo - Dipartimento di Ingegneria - Building 19

17:00 - 18:00 CEST
SPECIAL MEETING ON INNOVATIVE START UP & ENTREPRENEURS - PANEL 2
Room: Room 1
Abstracts and Speakers' biographies are available HERE

Panel 2: Successful startups – how they succeed
Moderator: Monica Guizzardi

17:00   17tons – Nahla Salem

17:10   ResourSEAs – Roberta Cucchiara

17:20   KazaamLab – Simona Rombo

17:30   ESCO Mobility – Francesco Di Simone

17:40   Q&A

17:00 - 18:45 CEST
SESSION S1C
Electrification of Small Islands & Electric Marine Transportation
Room: Room 2
Chairs: Marco Merlo, *Politecnico di Milano, Italy*
              Enrico Ragaini, *ABB*

17:00   INVITED - Electric ship design: concepts, research challenges, proofs
              Giorgio Sulligoi, University of Trieste, Italy

17:30   Predictive Optimal Dispatch for Islanded Distribution Grids Considering
              Operating Reserve Constraints
              Sergio Bruno, Politecnico di Bari, Italy
              Giovanni Giannoccaro, Politecnico di Bari, Italy
              Cosimo Iurlaro, Politecnico di Bari, Italy
              Massimo La Scala, Politecnico di Bari, Italy
              Marco Menga, Politecnico di Bari, Italy

17:45   **On the Participation of Demand-Side Resources on the Operation of Small Power Systems** [ON-LINE]

Fábio Pessoa, University of Coimbra, Portugal
Álvaro Gomes, University of Coimbra, Portugal

18:00   **Impact of Non-Programmable Distributed Generation in an Islanded Microgrid: The Case Study of Ustica**

Giuseppe Caravello, Unversity of Palermo, Italy
Giovanni Artale, Unversity of Palermo, Italy
Antonio Cataliotti, Unversity of Palermo, Italy
Valentina Cosentino, Unversity of Palermo, Italy
Nicola Panzavecchia, National Research Council, Italy
Valeria Boscaino, National Research Council, Italy
Salvatore Guaiana, National Research Council, Italy
Giovanni Tinè, CNR-INM, Italy
Vito Ditta, Unversity of Palermo, Italy
Dario Di Cara, National Research Council, Italy

18:15   **GIS Approach for Modeling the Electricity Grid of Small Islands Using Open-Source Data: The Case of Isola del Giglio**

Aleksandar Dimovski, Politecnico di Milano, Italy
Enrico Ragaini, ABB, Italy
Darlain Edeme, Politecnico di Milano, Italy
Silvia Corigliano, Politecnico di Milano, Italy
Marco Merlo, Politecnico di Milano, Italy

18:30   **Assessing the Economic Benefit Due to BESS Management in a Renewable Energy Community of a Small Island**

Antonino Barberi, University of Palermo, Italy
Vincenzo Di Dio, University of Palermo, Italy
Biagio Di Pietra, ENEA, Italy
Salvatore Favuzza, University of Palermo, Italy
Mauro Galluzzo, University of Palermo, Italy
Rossano Musca, University of Palermo, Italy
Fabio Massaro, University of Palermo, Italy
Gaetano Zizzo, University of Palermo, Italy

17:00 - 18:15 CEST
SESSION S2C
Smart Materials & Smart Sensors for Industry 4.0
Room: Room 3
Chair: Pio Lombardi, *Fraunhofer Institute for Factory Operation and Automation IFF, Germany*

17:00 **Measurements of Two-Phase Flows in Pipelines Using Radioisotopes and Statistical Signal Processing**
Robert Hanus, Rzeszów University of Technology, Poland
Marcin Zych, AGH University of Science and Technology, Poland
Anna Golijanek-Jędrzejczyk, Gdańsk University of Technology, Poland

17:15 **A Battery-Free Wireless Smart Sensor Platform With Bluetooth Low Energy Connectivity for Smart Agriculture**
Roberto La Rosa, STMicroelectronics, Italy, EPFL, Switzerland
Catherine Dehollain, EPFL, Switzerland
Mario Costanza, Femto-st research institute, France
Angelo Speciale, STMicroelectronics, Italy
Fabio Viola, University of Palermo, Italy
Patrizia Livreri, University of Palermo, Italy

17:30 **Investigation of PCB-Based Inductive Sensors Orientation for Corona Partial Discharge Detection**
Antonino Imburgia, University of Palermo, Italy
Sinda Kaziz, University of Monastir, Tunisia
Pietro Romano, University of Palermo, Italy
Denis Flandre, Université catholique de Louvain, Belgium
Giovanni Artale, University of Palermo, Italy
Giuseppe Rizzo, Prysmian group, Italy
Fabio Viola, University of Palermo, Italy
Fares Tounsi, Université catholique de Louvain, Belgium
Guido Ala, University of Palermo, Italy

17:45 **3D Additive Manufacturing of Tapered EBG Layers for a Resonant-Cavity Antenna**
Cristina Ponti, Roma Tre University, Italy
Paolo Baccarelli, Roma Tre University, Italy
Silvio Ceccuzzi, ENEA, Italy
Giuseppe Schettini, Roma Tre University, Italy

18:00 **An ASIC Data Readout Processor for the ALICE HMPID and Charged Particle Veto Detectors** [ON-LINE]
Clive Seguna, University of Malta, Malta
Edward Gatt, University of Malta, Malta
Ivan Grech, University of Malta, Malta
Owen Casha, University of Malta, Malta
Giacinto De Cataldo, University of Bari, Italy

17:00 - 18:30 CEST
SESSION S3C - P2
Neural and Cognitive Engineering - Part 2
Room: Room 4
Chairs: Anna Maria Bianchi, *Politecnico di Milano, Italy*
Henrique Madeira, *University of Coimbra, Portugal*

17:00 **Quantitative Measures of Autonomic Activations During Software Development**
Giulio Steyde, Politecnico di Milano, Italy
Alessandra Calcagno, Politecnico di Milano, Italy
Pierluigi Reali, Politecnico di Milano, Italy
Anna M. Bianchi, Politecnico di Milano, Italy

17:15 **Impact of Ultra-Short-Term HRV Features in Software Code Sections Complexity Classification**
André Matias Bernardes, University of Coimbra, Portugal
Ricardo Couceiro, University of Coimbra, Portugal
Júlio Cordeiro Medeiros, University of Coimbra, Portugal
Jorge Henriques, University of Coimbra, Portugal
César Teixeira, University of Coimbra, Portugal
João Durães, University of Coimbra, Portugal
Henrique Madeira, University of Coimbra, Portugal
Paulo Carvalho, University of Coimbra, Portugal

17:30 **Sustained Attention Task-Related Changes of Functional Connectivity in Children With ADHD**
Stefania Coelli, Politecnico di Milano, Italy
Alessandra Calcagno, Politecnico di Milano, Italy
Eleonora Iascone, Politecnico di Milano, Italy
Ludovica Gaspari, Politecnico di Milano, Italy
Maria Canevini, University of Milan, A. O. San Paolo, Italy
Anna M. Bianchi, Politecnico di Milano, Italy

17:45 **Personality Traits Classification From EEG Signals Using EEGNet**
Veronika Guleva, Politecnico di Milano, Italy
Alessandra Calcagno, Politecnico di Milano, Italy
Pierluigi Reali, Politecnico di Milano, Italy
Anna M. Bianchi, Politecnico di Milano, Italy

18:00 **Cognitive Computing Tools for Identification and Classification of Brain Tumors Starting From Magnetic Resonance Imaging: Preliminary Results**
Camilla Russo, University of Naples Federico II, Italy
Paolo Maresca, University of Naples Federico II, Italy
Alfredo Marinelli, University of Naples Federico II, Italy

18:15 **Using SVM for Alzheimer's Disease Detection From 3D T1MRI** [ON-LINE]
Rashmi Kumari, Bennett University, India
Shivani Goel, Bennett University, India
Subhranil Das, Birla Institute of Technology, India

17:00 - 18:15 CEST
SESSION S4C - P2
Remote Sensing Methods and Applications - Part 2
Room: Room 5
Chairs: Gloria Bordogna, *CNR-IREA, Italy*
Dino Ienco, *INRAE, UMR TETIS, France*

17:00 **SAR Sea Surface Currents Estimation Over Long Strips of the Adriatic Sea**
Virginia Zamparelli, IREA-CNR, Italy
Gianfranco Fornaro, IREA-CNR, Italy

17:15 **Multi-Spectral Sensors Monitoring of the Epidemic of Xylella Fastidiosa in the Apulia Region**
Sara Dell'Anna, Politecnico di Torino, Italy
Giuseppe Mansueto, ITHACA, Italy
Piero Boccardo, Politecnico di Torino, Italy
Emere Arco, Politecnico di Torino, Italy

17:30 **Use of Multi-Temporal SAR Non-Local Mean Filtering Operations for Change Detection Analyses** [ON-LINE]
Antonio Pepe, National Council Research, Italy

17:45 **Dealing With Missing Modalities at Test Time for Land Cover Mapping: A Case Study on Multi-Source Optical Data**
Yawogan Jean Eudes Gbodjo, INRAE, France
Dino Ienco, INRAE, France

18:00 **Support Vector Machine for Volcano Hazard Monitoring From Space at Mount Etna** [ON-LINE]

Ciro Del Negro, Istituto Nazionale di Geofisica e Vulcanologia, Italy
Eleonora Amato, Istituto Nazionale di Geofisica e Vulcanologia, Italy
Federica Torrisi, Istituto Nazionale di Geofisica e Vulcanologia, Italy
Claudia Corradino, Istituto Nazionale di Geofisica e Vulcanologia, Italy
Maide Bucolo, University of Catania, Italy
Luigi Fortuna, University of Catania, Italy

17:00 - 18:15 CEST
SESSION S4D
Smart Education Technologies
Room: Room 6
Chairs: Francesca Pozzi, *CNR, Istituto Tecnologie Didattiche, Italy*
Symeon Retalis, *University of Piraeus - Department of Digital Systems, Greece*

17:00 **INVITED - Smart ecosystems at the root of the wellbeing in education: from theoretical definitions to practical implementations** [ON-LINE]

Carlo Giovannella, ASLERD & University of Rome Tor Vergata, Italy

17:30 **Smartness Dimensions in Designing Collaborative Learning Activities**

Francesca Pozzi, CNR-ITD, Italy
Donatella Persico, CNR-ITD, Italy
Marcello Passarelli, CNR-ITD, Italy
Andrea Ceregini, CNR-ITD, Italy
Pietro Polsinelli, OpenLab, Italy
Matteo Bicocchi, OpenLab, Italy

17:45 **Bare Conductive Ink as a Tool to Teach Pupils EFL Vocabulary** [ON-LINE]

Alice Pagano, Università di Genova, Italy
Giulia Lombardi, Università di Genova, Italy
Rita Cersosimo, Università di Genova, Italy

18:00 **The Role of Artificial Intelligence in Smart Classes: A Survey** [ON-LINE]

Eleni Dimitriadou, Cyprus University of Technology, Cyprus
Andreas Lanitis, Cyprus University of Technology, Cyprus

20:00 - 23:30
GALA DINNER
Villa Chiaramonte Bordonaro - Palermo

Technical Program - Thursday, June 16

08:00 - 15:00
REGISTRATION
Room: University of Palermo - Dipartimento di Ingegneria - Building 19

08:30 - 10:30 CEST
WIE/YOUNG STUDENT PROJECTS COMPETITION
Room: Room 1
Chair: Patrizia Lamberti, *Vice-Chair of the WIE AG IEEE Italy Section*

08:30 - 10:30 CEST
SESSION S1J
Cyber Security and Big Data Issues for Smart Grid Systems
Room: Room 2
Chairs: Seref Sagiroglu, *Gazi University, Turkey*
Pierluigi Gallo, *Università di Palermo, Italy*

08:30   **Digital Data Integration Project Between a DSO and a University for Sustainability and Efficiency**
Emin Kartci, Ozyegin University, Turkey
Eda Emniyet Akkus, Yesilirmak Electric Distribution Co., Turkey
Semanur Sancar, Ozyegin University, Turkey
Tuba Avsar Bugdayci, Yesilirmak Electric Distribution Co., Turkey
Mutlu Bektas, Yesilirmak Electric Distribution Co., Turkey
Gokturk Poyrazoglu, Ozyegin University, Turkey

08:45   **Impact of Data Granularity and Distribution Network Modeling on the Energy Community Operation**
Andrea Mazza, Politecnico di Torino, Italy
Stefano Aime, Politecnico di Torino, Italy
Gianfranco Chicco, Politecnico di Torino, Italy

09:00   **Long Term Scenarios: Optimal Selection of a Representative Set of Climatic Years for the Simulation of the National Electricity System**
Ivan De Palma, Italy

Nunzia Riccio, Terna S.p.A., Rome, Italy
Enrico De Tuglie, Politecnico di Bari, Italy
Pierluigi Di Cicco, Terna S.p.A., Rome, Italy

09:15   **Deep Learning for Classification of FDIs on Time-Series Sensor Data in Cyber-Physical Power Systems [ON-LINE]**
Siddhartha Deb Roy, National Institute of Technology Meghalaya, India
Sanjoy Debbarma, National Institute of Technology Meghalaya, India

09:30   **Machine Learning Architecture for Signature-Based IoT Intrusion Detection in Smart Energy Grids**
Nikhil Yadav, St. John's University, USA
Laura Truong, St. John's University, USA
Erald Troja, St. John's University, USA
Mehrdad Aliasgari, California State University, USA

09:45   **A Privacy-Preserving Blockchain Solution to Support Demand Response in Energy Trading**
Lorenzo Bracciale, University of Rome "Tor Vergata", Italy
Pierpaolo Loreti, University of Rome "Tor Vergata", Italy
Emanuele Raso, University of Rome "Tor Vergata", Italy
Giuseppe Bianchi, University of Rome "Tor Vergata", Italy
Pierluigi Gallo, University of Palermo, Italy
Eleonora Riva Sanseverino, University of Palermo, Italy

10:00   **KEYNOTE - Big Data Analytics, Security and Privacy Issues in Smart Energy Systems [ON-LINE]**
Seref Sagiroglu, Gazi University, Turkey

08:30 - 10:30 CEST
SESSION S1G - P1
Smart solution for high penetration of PV generation in Renewable Energy Communities - Part 1
Room: Room 3
Chairs: José M. Blanes, *University Miguel Hernández of Elche, Spain*
Gabriele Maria Lozito, *University of Firenze, Italy*
Fabio Viola*, University of Palermo, Italy*

08:30   **Experimental Characterization of Filter Reactors for Grid-Connected Solar Photovoltaic Systems**
Antonio Faba, University of Perugia, Italy
Ermanno Cardelli, University of Perugia, Italy

08:45 **Power Quality Analysis of Power Converters for Photovoltaic Systems in Avionic Applications**
Antonio Faba, University of Perugia, Italy
<u>Ermanno Cardelli, University of Perugia, Italy</u>

09:00 **PVMODEL: An Online Photovoltaic Modelling Tool**
<u>Vicente Galiano, Miguel Hernández University of Elche, Spain</u>
José Blanes, Miguel Hernández University of Elche, Spain
Francisco Javier Toledo, Miguel Hernández University of Elche, Spain
Victoria Herranz, Miguel Hernández University of Elche, Spain
Antonino Laudani, University of Roma Tre, Italy

09:15 **High-Reliability Solar Array Regulator Proposal for Harsh Environments**
Cristian Torres, University Miguel Hernández of Elche, Spain
<u>José Blanes, University Miguel Hernández of Elche, Spain</u>
Ausias Garrigos, University Miguel Hernández of Elche, Spain
David Marroquí, University Miguel Hernández of Elche, Spain
Carlos Orts, University Miguel Hernández of Elche, Spain
José António Carrasco, University Miguel Hernández of Elche, Spain

09:30 **Pareto Optimization Strategy for Clustering of PV Prosumers in a Renewable Energy Community**
Francesco Grasso, University of Florence, Italy
Gabriele Lozito, University of Florence, Italy
<u>Francesco Riganti Fulginei, Roma Tre University, Italy</u>
Giacomo Talluri, University of Florence, Italy

09:45 **Artificial Load Profiles and PV Generation in Renewable Energy Communities Using Generative Adversarial Networks**
<u>Francesco Grasso, University of Florence, Italy</u>
Carlos A. Iturrino, University of Florence, Italy
Gabriele Lozito, University of Florence, Italy
Giacomo Talluri, University of Florence, Italy

10:00 **INVITED - Demand-Side Management and Sector Coupling to Optimize the Integration of PV Generation in Renewable Energy Communities**
<u>Daniela Proto, University of Naples Federico II, Italy</u>

08:30 - 10:30 CEST
SESSION S3D
E-Health and IoT for Smart HealthCare
Room: Room 4
Chairs: Henri Korkalainen, *University of Eastern Finland, Finland*
Nicos Maglaveras, *Aristotle University, Greece*
Massimo Mischi, *Eindhoven University of Technology, The Netherlands*

08:30   **A Model for Digital Sweat Sensing Devices**
Jelte Haakma, Eindhoven University of Technology, The Netherlands
Elisabetta Peri, Eindhoven University of Technology, The Netherlands
Simona Turco, Eindhoven University of Technology, The Netherlands
Eduard Pelssers, Eindhoven University of Technology, The Netherlands
Jaap den Toonder, Eindhoven University of Technology, The Netherlands
Massimo Mischi, Eindhoven University of Technology, The Netherlands

08:45   **Data Processing Using Edge Computing: A Case Study for the Remote Care Environment [ON-LINE]**
Ian Chetcuti, University of Malta, Malta
Conrad A Attard, University of Malta, Malta
Joseph Bonello, University of Malta, Malta

09:00   **Biometric-Based Packet Validation Scheme for Body Area Network Smart Healthcare Devices [ON-LINE]**
Vincent O. Nyangaresi, Tom Mboya University College, Kenya
Mustafa Al Sibahee, Iraq University College, Iraq
Zaid Abduljabbar, University of Basrah, Iraq
Junchao Ma, Shenzhen Technology University, China
Mustafa Khalefa, University of Basrah, Iraq

09:15   **Correlation Between Wearable Inertial Sensor Data and Standardised Parkinson's Disease Axial Impairment Measures Using Machine Learning**
Luigi Borzì, Politecnico di Torino, Italy
Alessandro Manoni, Sapienza University of Rome, Italy
Alessandro Zampogna, Sapienza University of Rome, Italy
Fernanda Irrera, Sapienza University of Rome, Italy
Antonio Suppa, Sapienza University of Rome, Italy
Gabriella Olmo, Politecnico di Torino, Italy

09:30 **Performance Assessment of Microneedle Dry and Wet Gel Electrodes Using a Dual-Channel, Single Lead Wearable ECG Device**
Om Prakash Singh, Tyndall National Institute, University College Cork, Ireland
Yuan Hu, Tyndall National Institute, University College Cork, Ireland
Andrea Bocchino, Tyndall National Institute, University College Cork, Ireland
Theo Guillerm, Tyndall National Institute, University College Cork, Ireland
Conor O'Mahony, Tyndall National Institute, University College Cork, Ireland

09:45 **Covid-19 Symptoms Monitoring Sensor Network for Isolation Rooms at Hospitals** [ON-LINE]
Ghanim Y GH S Alomani, American University of the Middle East, Kuwait
Abdulsamad D S Darwesh, American University of the Middle East, Kuwait
Shehab A J M AlSennei, American University of the Middle East, Kuwait
Husain A M A Buabbas, American University of the Middle East, Kuwait
Abdulmohsen F M A AlGhareeb, American University of the Middle East, Kuwait
Hossam O. Ahmed, American University of the Middle East, Kuwait

10:00 **INVITED - The ultrasound revolution, from ultrafast to molecular imaging**
Massimo Mischi, Eindhoven University of Technology, The Netherlands

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08:30 - 10:30 CEST
SESSION S4E - P1
Cognitive Computing, Artificial Intelligence & Machine Learning - Part 1
Room: Room 5
Chairs: Danilo Pau, *ST Microelectronics, Italy*
Mattia Rigotti, *IBM Research, Switzerland*

08:30 **Complexity Bounded Classification of Fish-Eye Distorted Objects With Micro-Controllers**
Danilo Pietro Pau, STMicroelectronics, Italy
Alessandro Carra, STMicroelectronics, Italy
Marco Garzola, Tecniplast S.p.A., Italy
Laura Falaschetti, Università Politecnica delle Marche, Italy
Claudio Turchetti, Università Politecnica delle Marche, Italy

08:45 **Tiny Neural Networks for ISM Band Demodulation** [ON-LINE]
Marco Forleo, STMicroelectronics, Italy
Danilo Pietro Pau, STMicroelectronics, Italy
Nicolo' Ivan Piazzese, STMicroelectronics, Italy

09:00 **Automated Neural and On-Device Learning for Micro Controllers**
Danilo Pietro Pau, STMicroelectronics, Italy
Prem Ambrose, STMicroelectronics, Italy

09:15 **Design of a Cloud-Based Data Platform for Standardized Machine Learning Workflows With Applications to Transport Infrastructure**
Andrea Bartezzaghi, IBM Research, Switzerland
Ioana Giurgiu, IBM Research - Zurich, Switzerland
Chiara Marchiori, IBM Zurich Research Center, Switzerland
Mattia Rigotti, IBM Research, Switzerland
Rizal Sebastian, TNO - Netherlands Organisation for Applied Scientific Research, The Netherlands
A. Cristiano I. Malossi, IBM Research - Zurich, Switzerland

09:30 **Question Answering With BERT: Designing a 3D Virtual Avatar for Cultural Heritage Exploration**
Mariella Farella, National Research Council, University of Palermo, Italy
Giuseppe Chiazzese, National Research Council, Italy
Giosuè Lo Bosco, University of Palermo, Italy

09:45 **KEYNOTE - Towards Automated Visual Inspection of Civil Engineering Structures**
Mattia Rigotti, IBM Research Zurich

08:30 - 10:00 CEST
SESSION S1H - P1
Wireless Power transfer and Power Electronics Systems - Part 1
Room: Room 6
Chairs: Luigi Costanzo, *University of Campania Luigi Vanvitelli, Italy*
Minh Nguyen, *Thai Nguyen University of Technology,Vietnam*

08:30 **Center-Fed Resonator Array for Increased Misalignment Tolerance in Automotive Wireless Power Transfer**
Mattia Simonazzi, University of Bologna, Italy
Leonardo Sandrolini, University of Bologna, Italy
Alessandro Campanini, University of Bologna, Italy
José Alberto, Universidade Lusófona de Humanidades e Tecnologias, Portugal
Andrea Mariscotti, University of Genova, Italy

08:45   **Voltage Adaptation or Resistance Matching in Backpack Regenerative Systems?**

Luigi Costanzo, Università degli Studi della Campania Luigi Vanvitelli, Italy
Mingyi Liu, Virginia Tech, USA
Alessandro Lo Schiavo, Università degli Studi della Campania Luigi Vanvitelli, Italy
Massimo Vitelli, Università degli Studi della Campania Luigi Vanvitelli, Italy
Lei Zuo, Virginia Tech, USA

09:00   **Coupled Inductor Core Design Methodology to Improve Power-Density for Interleaved Buck Converter With 22kW-Class Wireless Charging of EV**

Jin Chul Kim, Korea National University of Transportation, Korea
Hyung Woo Lee, Korea National University of Transportation, Korea
Chan Bae Park, Korea National University of Transportation, Korea
Jae Bum Lee, Korea National University of Transportation, Korea
Dong Kyun Kim, Korea National University of Transportation, Korea
Sang Gyun Ryu, Korea National University of Transportation, Korea
Seong-Yong Hong, Korea National University of Transportation, Korea

09:15   **Application of a Power Source for Hydrogen Fuel Cell Railway Vehicles in Multiple Resonant LLC Converter With Parallel-Input and Series-Output**

Dong Kyun Kim, Korea National University of Transportation, Korea
Hyung Woo Lee, Korea National University of Transportation, Korea
Chan Bae Park, Korea National University of Transportation, Korea
Jae Bum Lee, Korea National University of Transportation, Korea
Sang Gyun Ryu, Korea National University of Transportation, Korea
Jae Hyeon Lim, Korea National University of Transportation, Korea
Jin Chul Kim, Korea National University of Transportation, Korea

09:30   **Dual-Topology Cross-Coupled Configuration of Switched Capacitor Converter for Wide Range of Application** [ON-LINE]

Saahithi Suresh, Reva University, India
Busireddy Hemanth Kumar, Sree Vidyanikethan Engineering College, India
Kalvakurthi Jyotheeswara Reddy, VIT University, India
Ritesh Dash, KIIT University, India
Vivekanandan Subburaj, NITK Surathkal, India

09:45   **Finite Element Analysis of Copper Wire for Wireless Power Transfer Applications**

Luca Pugi, University of Florence, Italy
Francesco Grasso, University of Florence, Italy
Libero Paolucci, University of Florence, Italy
Leonardo Luchetti, University of Florence, Italy
Giacomo Zini, University of Florence, Italy

10:30 - 11:00
COFFEE BREAK
Room: University of Palermo - Dipartimento di Ingegneria - Building 19

11:00 - 13:00 CEST
SESSION S1L
Application of Machine Learning and Artificial Intelligence in Smart Grids
Room: Room 1
Chairs: Alessandro D'Innocenzo, *University of Aquila, Italy*
Gianfranco Chicco, *Politecnico di Torino, Italy*

11:00 **INVITED - Understanding the Italian electricity markets through the data analytics approach**
Tao Huang, Politecnico di Torino, Italy

11:30 **On Substrates, Blocks and States: Distributed Energy Resources' Diffusion Models, Use Cases and Frontiers in Power System Planning**
Fabian Heymann, INESC TEC, Portugal
Joel Villavicencio Gastelu, Federal University of ABC, Brazil
Anselmo Rajabo Anselmo, Federal University of ABC, Brazil
Joel D Melo, Federal University of ABC, Brazil

11:45 **An Ontological Approach for Automatic Tracking Causes of Blackouts in Power Systems**
Tao Huang, Politecnico di Torino, Italy
Martina Baiocchi, Politecnico di Torino, Italy
Xia Lei, Xihua University, China

12:00 **An Asymmetric Loss With Anomaly Detection LSTM Framework for Power Consumption Prediction**
Jihan Ghanim, American University of Beirut, Lebanon
Maha Issa, American University of Beirut, Lebanon
Mariette Awad, American University of Beirut, Lebanon

12:15 **Graph Neural Network Power Flow Solver for Dynamical Electrical Networks**
Tania B. López-García, University of Zaragoza, Spain
José A Domínguez-Navarro, University of Zaragoza, Spain

12:30 **Video Discharge Extractor: A Deep Learning and Computer Vision-Based Framework for Surface Discharges Recognition on HV Lines Insulators**
Alberto Maldarella, RSE Spa, Italy
Gabriele Lami, Elif Lab, Italy
Enea Bionda, RSE Spa, Italy
Carlo Tornelli, RSE Spa, Italy
Giovanni Pirovano, RSE Spa, Italy
Sergio Ludovico Chiarello, RSE Spa, Italy

12:45 **Ultra-Short-Term Photovoltaic Output Power Forecasting Using Deep Learning Algorithms**
Berhane Darsene Dimd, Norwegian University of Science and Technology, Norway
Steve Völler, Norwegian University of Science and Technology, Norway
Ole-Morten Midtgård, Norwegian University of Science and Technology, Norway
Tarikua Mekashaw Zenebe, Norwegian University of Science and Technology, Norway

11:00 - 12:45 CEST
SESSION S1K - P1
Energy Management, Smart Metering and Distributed Energy Resources - Part 1
Room: Room 2
Chairs: Giuditta Pisano, *University of Cagliari, Italy*
Ciro Spataro, *University of Palermo, Italy*
Pietro Romano*, University of Palermo, Italy*

11:00 **The Decentralized Grid-Aware P2P Energy Market Enabled by a Distributed Ledger Implementation**
Robert Jahn, TU Dortmund University, Germany
Oliver Kraft, TU Dortmund University, Germany
Marcel Klaes, TU Dortmund University, Germany
Dennis Schmid, TU Dortmund University, Germany
Christian Rehtanz, TU Dortmund University, Germany
Ulf Haeger, TU Dortmund University, Germany

11:15 **Optimisation of Generation Models for Clusters of Photovoltaic Plants**
Alessandro Ciocia, Politecnico di Torino, Italy
Gianfranco Chicco, Politecnico di Torino, Italy
Filippo Spertino, Politecnico di Torino, Italy

11:30 **Experimental Tests About the Efficiency of Commercial Hybrid PV Inverters Operating at Variable Power Factor**
Giuseppe Marco Tina, University of Catania, Italy
Cristina Ventura, University of Catania, Italy

Luigi Lanuzza, Enel X Inn, Prod Lab, Italy
Massimiliano De Benedetti, Enel X Inn, Prod Lab, Italy
Daniele Dugo, Enel X Inn, Prod Lab, Italy

11:45 **Cost Sensitivity Analysis to Uncertainty in Demand and Renewable Energy Sources Forecasts**
Nikolina Čović, University of Zagreb, Croatia
Domagoj Badanjak, University of Zagreb, Croatia
Karlo Šepetanc, University of Zagreb, Croatia
Hrvoje Pandzic, University of Zagreb, Croatia

12:00 **Real-Time Distribution Grid Control and Flexibility Provision Under Uncertainties: Laboratory Demonstration**
Mohammad Rayati, University of Applied Sciences of Western Switzerland, Switzerland
Mokhtar Bozorg, University of Applied Sciences of Western Switzerland, Switzerland
Mauro Carpita, University of Applied Sciences of Western Switzerland, Switzerland
Pasquale De Falco, University of Naples Parthenope, Italy
Pierluigi Caramia, University of Naples Parthenope, Italy
Antonio Bracale, University of Naples Parthenope, Italy
Daniela Proto, University of Naples Federico II, Italy
Fabio Mottola, University of Naples Federico II, Italy

12:15 **Comparing R-Vine Copulas and Quantile Regression Forests for Reliability Forecasting of Renewable Energies**
Stefan Möws, Hamburg University of Technology, Germany
Marisa Ahrens, Hamburg University of Technology, Germany
Christian Becker, Hamburg University of Technology, Germany

12:30 **A Template Model to Assess the DC Stability of Green Charging Microgrids**
Andrea Alessia Tavagnutti, University of Trieste, Italy
Daniele Bosich, University of Trieste, Italy
Stefano Pastore, University of Trieste, Italy
Giorgio Sulligoi, University of Trieste, Italy

11:00 - 13:00 CEST
SESSION S1G - P2
Smart solution for high penetration of PV generation in Renewable Energy Communities - Part 2
Room: Room 3
Chairs: José M. Blanes, *University Miguel Hernández of Elche, Spain*
Gabriele Maria Lozito, *University of Firenze, Italy*
Fabio Viola*, University of Palermo, Italy*

11:00 **INVITED - Microgrids for energy communities: the power sharing model**
Luigi Martirano, Sapienza University of Rome, Italy

11:30 **A Python Tool for Simulation and Optimal Sizing of a Storage Equipped Grid Connected Photovoltaic Power System**
Elisa Belloni, University of Perugia, Italy
Gabriele Lozito, University of Florence, Italy
Alberto Reatti, University of Florence, Italy

11:45 **Simulation-Based Assessment of Supercapacitors as Enabling Technology for Fast Charging in Micromobility**
Maurizio Laschi, University of Florence, Italy
Fabio Corti, University of Perugia, Italy
Gabriele Lozito, University of Florence, Italy
Dario Vangi, University of Florence, Italy
Michelangelo S. Gulino, University of Florence, Italy
Luca Pugi, University of Florence, Italy
Alberto Reatti, University of Florence, Italy

12:00 **Control Strategies for Output Voltage Regulation in a SS Compensated Wireless Charging System**
Vittorio Bertolini, University of Perugia, Italy
Fabio Corti, University of Perugia, Italy
Ermanno Cardelli, University of Perugia, Italy
Alberto Reatti, University of Florence, Italy

12:15 **Comparison of Control Strategies for Dual Active Bridge Converter**
Fabio Corti, University of Perugia, Italy
Vittorio Bertolini, University of Perugia, Italy
Alberto Reatti, University of Florence, Italy
Ermanno Cardelli, University of Perugia, Italy
Marco Giallongo, University of Florence, Italy

12:30 **Optimal Expansion Planning of Integrated Natural Gas and Electricity Network With High Penetration of Wind and Solar Power Under Uncertainty**
[ON-LINE]
Patrick Sunday Onen, University of Bradford, United Kingdom
Geev Mokryani, University of Bradford, United Kingdom
Rana Zubo, Northern Technical University, Iraq

12:45 **MPP Tracking Optimization of Complete PV Installations Attaining Minimum Losses**
Zaint Abufarha Alexakis, University of Patras, Greece
Antonio T Alexandridis, University of Patras, Greece

11:00 - 13:00 CEST
SESSION S3E
Big Data Integration and Personalised Medicine
Room: Room 4
Chairs: Luca Faes, *University of Palermo, Italy*
Giandomenico Nollo, *University of Trento, Italy*

11:00 **KEYNOTE - Virtual coaching emerges-Developments and advances on persuasive coaching** [ON-LINE]
Dimitrios I Fotiadis, University of Ioannina, Ioannina, Greece

11:45 **Assessment of Driving Stress Through SVM and KNN Classifiers on Multi-Domain Physiological Data**
Damiano Fruet, University of Trento, Italy
Chiara Barà, University of Palermo, Italy
Riccardo Pernice, University of Palermo, Italy
Luca Faes, University of Palermo, Italy
Giandomenico Nollo, University of Trento, Italy

12:00 **Analysis of Cardiac Pulse Arrival Time Series at Rest and During Physiological Stress**
Chiara Barà, University of Palermo, Italy
Riccardo Pernice, University of Palermo, Italy
Laura Sparacino, University of Palermo, Italy
Yuri Antonacci, University of Palermo, Italy
Michal Javorka, Comenius University, Slovakia
Luca Faes, University of Palermo, Italy

12:15 **An Integrated Multimodal Approach to Evaluate Autonomic Control, Cerebral Autoregulation and Cognitive Function in Patients Undergoing Surgical Aortic Valve Replacement During a 3-Months Follow-Up**
Vlasta Bari, IRCCS Policlinico San Donato, Italy
Francesca Gelpi, University of Milan, Italy
Noemi Cornara, IRCCS Policlinico San Donato, Italy
Beatrice Cairo, University of Milan, Italy
Beatrice De Maria, IRCCS Istituti Clinici Scientifici Maugeri, Italy
Enrico Bertoldo, IRCCS Policlinico San Donato, Italy
Valentina Fiolo, IRCCS Policlinico San Donato, Italy
Edward Callus, IRCCS Policlinico San Donato, University of Milan, Italy
Carlo De Vincentiis, IRCCS Policlinico San Donato, Italy
Marianna Volpe, IRCCS Policlinico San Donato, Italy
Raffaella Molfetta, IRCCS Policlinico San Donato, Italy

Moreno Zanardo, University of Milan, Italy
Paolo Vitali, IRCCS Policlinico San Donato, Italy
Francesco Sardanelli, IRCCS Policlinico San Donato, Italy
Marco Ranucci, IRCCS Policlinico San Donato, Italy
Alberto Porta, IRCCS Policlinico San Donato, University of Milan, Italy

12:30 **Low-Invasive Multisensor Real-Time Acquisition System for the Assessment of Cardiorespiratory and Skin Conductance Parameters**
Gabriele Volpes, University of Palermo, Italy
Simone Valenti, University of Palermo, Italy
Antonino Parisi, University of Palermo, Italy
Alessandro Busacca, University of Palermo, Italy
Luca Faes, University of Palermo, Italy
Riccardo Pernice, University of Palermo, Italy

12:45 **Information Extraction From Clinical Records: An Example for Breast Cancer**
Ivan Lazić, University of Novi Sad, Serbia
Nikša Jakovljević, University of Novi Sad, Serbia
Jasmina Boban, University of Novi Sad, Serbia
Igor Nosek, University of Novi Sad, Serbia
Tatjana Loncar-Turukalo, University of Novi Sad, Serbia

11:00 - 13:00 CEST
SESSION S4E - P2
Cognitive Computing, Artificial Intelligence & Machine Learning - Part 2
Room: Room 5
Chairs: Danilo Pau, *ST Microelectronics, Italy*
Mattia Rigotti, *IBM Research, Switzerland*

11:00 **Risk Prediction in the Life Insurance Industry Using Federated Learning Approach** [ON-LINE]
Harshit Gupta, Indian Institute of Information Technology Allahabad India, India
Dhairya Patel, Indian Institute of Information Technology Allahabad India, India
Anurag Makade, Indian Institute of Information Technology Allahabad India, India
Kapil Gupta, Indian Institute of Information Technology Allahabad India, India
Om Prakash Vyas, Indian Institute of Information Technology Allahabad India, India
Antonio Puliafito, University of Messina, Italy

11:15 **Training of an ANN Feed-Forward Regression Model to Predict Wind Farm Power Production for the Purpose of Active Wake Control**
Philip Krajinski, Ruhr University Bochum, Germany
Constantinos Sourkounis, Ruhr University Bochum, Germany

11:30 **Exploring How Weak Supervision Can Assist the Annotation of Computer Vision Datasets**

Andrea Abela, University of Malta, Malta
Dylan Seychell, University of Malta, Malta
Mark Bugeja, University of Malta, Malta

11:45 **Baggage Threat Recognition Using Deep Low-Rank Broad Learning Detector**

Divya Velayudhan, Khalifa University, United Arab Emirates
Taimur Hassan, Khalifa University, United Arab Emirates
Abdelfatah Hassan Ahmed, Khalifa University, United Arab Emirates
Ernesto Damiani, Khalifa University, United Arab Emirates
Naoufel Werghi, Khalifa University, United Arab Emirates

12:00 **A Flexible HLS Hoeffding Tree Implementation for Runtime Learning on FPGA** [ON-LINE]

Luís Miguel Sousa, University of Porto, Portugal
Nuno M. Paulino, University of Porto, Portugal
João C Ferreira, University of Porto, Portugal
João Bispo, University of Porto, Portugal

12:15 **An Efficient Ocular Disease Recognition System Implementation Using GLCM and LBP Based Multilayer Perception Algorithm**

Lakindu Induwara Mampitiya, Sri Lanka Institute of Information Technology, Sri Lanka
Namal Rathnayake, Kochi University of Technology, Japan

12:30 **Neural Network Decomposition and Distribution on Multiple Microcontrollers**

Biagio Montaruli, STMicroelectronics, Italy
Andrea Santamaria, STMicroelectronics, Politecnico di Milano, Italy
Danilo Pietro Pau, STMicroelectronics, Italy

12:45 **A Citizen Science Approach for the Collection of Data to Train Deep Learning Models** [ON-LINE]

Chantelle Saliba, University of Malta, Malta
Dylan Seychell, University of Malta, Malta
Joseph Buhagiar, University of Malta, Malta

11:00 - 13:00 CEST
SESSION S1H - P2
Energy Harvesting - Part 2
Room: Room 6
Chairs: Luigi Costanzo, *University of Campania Luigi Vanvitelli, Italy*
Minh Nguyen, *Thai Nguyen University of Technology, Vietnam*

11:00 **INVITED - Remote Sensing Networks: Technical Problems, Benefits and Challenges**
Minh T. Nguyen, Thai Nguyen University of Technology, Vietnam

11:30 **Self-Powered Extensible S-SSHI Based on RC Differential Circuit for Piezoelectric Energy Harvesting** [ON-LINE]
Yuyao Qi, Ningbo University, China
Yin-Shui Xia, Ningbo University, China

11:45 **Experimental Verification of an AC-DC Boost Towards Non-Periodic (AC) Energy Harvesting** [ON-LINE]
Carmine Stefano Clemente, University of Sannio, Italy
Daniele Davino, University of Sannio, Italy
Immacolato Iannone, University of Sannio, Italy
Vincenzo Paolo Loschiavo, University of Sannio, Italy

12:00 **A Novel Framework of Hybrid Harvesting Mechanisms for Remote Sensing Devices** [ON-LINE]
Minh T Nguyen, Thai Nguyen University of Technology, Vietnam
Hoang Tran, Duy Tan University, Vietnam
Cuong Van Nguyen, Thai Nguyen University of Technology, Vietnam
Guido Ala, University of Palermo, Italy
Fabio Viola, University of Palermo, Italy
Ilhami Colak, University of Gazi, Turkey

12:15 **Circuital Emulation for Testing Electromagnetic Vibration Energy Harvesters**
Luigi Costanzo, Università degli Studi della Campania Luigi Vanvitelli, Italy
Alessandro Lo Schiavo, Università degli Studi della Campania Luigi Vanvitelli, Italy
Massimo Vitelli, Università degli Studi della Campania Luigi Vanvitelli, Italy

12:30 **A High-Efficiency Optical Energy Harvester Based on a Low-Impedance Plasmonic Nanoantenna** [ON-LINE]
Aurelio Zinno, University of Palermo, Italy
Marco Scalici, University of Palermo, Italy
Patrizia Livreri, University of Palermo, Italy

12:45   **Performance Estimation for RF Wireless Power Transfer under Real-Life Scenario**
Romans Kusnins, Riga Technical University, Latvia
Ruslans Babajans, Riga Technical University, Latvia
Darja Cirjulina, Riga Technical University, Latvia
Janis Eidaks, Riga Technical University, Latvia
Anna Litvinenko, Riga Technical University, Latvia

13:00 - 14:00
LUNCH
Room: University of Palermo - Dipartimento di Ingegneria - Building 19

14:00 - 16:00 CEST
STUDENT & YP PROJECTS COMPETITION
Room: Room 1
Chair: Vincenzo Randazzo, *IEEE Italy Section YP AG Vice-chair*

14:00 - 16:00 CEST
SESSION S1K - P2
Energy Management, Smart Metering and Distributed Energy Resources - Part 2
Room: Room 2
Chairs: Giuditta Pisano, *University of Cagliari, Italy*
Ciro Spataro, *University of Palermo, Italy*
Pietro Romano*, University of Palermo, Italy*

14:00   **Automated Route Planning of Hydrogen Deliveries**
Georg Sehr, Fraunhofer Institute for Factory Operation and Automation IFF, Germany
Mathias Vorbröcker, Fraunhofer Institute for Factory Operation and Automation IFF, Germany
Torsten Birth, Fraunhofer Institute for Factory Operation and Automation IFF, Germany
Marcel Scheffler, Fraunhofer Institute for Factory Operation and Automation IFF, Germany
Sven Schiffner, Fraunhofer Institute for Factory Operation and Automation IFF, Germany

14:15   **Energy Exchange Management in Smart Grids Using a Knapsack Problem Inspired Approach** [ON-LINE]
Ayoub Zerka, Mohammed V University in Rabat, Morocco
Mohammed Ouassaid, Mohammed V University in Rabat, Morocco

Mohamed Maaroufi, Mohammed V University in Rabat, Morocco
Reda Rabeh, Mohammed V University in Rabat, Morocco

14:30   **Integrated Scheduling of Grid-Connected PV Pumping Stations and Irrigation Water Systems** [ON-LINE]
Natalia Naval, University of Zaragoza, Spain
Jose M Yusta, University of Zaragoza, Spain

14:45   **Digital Platforms in the Energy Sector - A Menu of Regulatory Options for Policy Makers**
Fabian Heymann, Swiss Federal Office of Energy, Switzerland
Matthias Galus, Swiss Federal Office of Energy, Switzerland

15:00   **A Proposal for Customer Baseline Load Evaluation From Electricity Bills**
Maria Luisa Di Silvestre, University of Palermo, Italy
Pierluigi Gallo, University of Palermo, Italy
Giovanni Restifo, University of Palermo, Italy
Eleonora Riva Sanseverino, University of Palermo, Italy
Giuseppe Sciumè, University of Palermo, Italy
Antony Vasile, University of Palermo, Italy

15:15   **An Optimal Energy Management Scheme of a Vehicle to Home** [ON-LINE]
Nsilulu Tresor Mbungu, Tshwane University of Technology, University of Sharjah, South Africa
Ali Ismail, Tshwane University of Technology, University of Sharjah, South Africa
Ramesh Bansal, Tshwane University of Technology, University of Sharjah, South Africa
Abdul-Kadir Hamid, University of Sharjah, United Arab Emirates
Raj Naidoo, University of Pretoria, South Africa

15:30   **Techno-Economic Analysis of Port Renewable Energy Communities**
Riccardo Trevisan, University of Cagliari, Italy
Emilio Ghiani, University of Cagliari, Italy
Simona Ruggeri, University of Cagliari, Italy
Susanna Mocci, University of Cagliari, Italy
Enrico De Tuglie, Politecnico di Bari, Italy
Fabrizio Pilo, University of Cagliari, Italy

15:45   **Imputation of Electrical Load Profile Data as Derived From Smart Meters** [ON-LINE]
Michael Farrugia, University of Malta, Malta
Kenneth Scerri, University of Malta, Malta
Andrew Sammut, University of Malta, Malta

14:00 - 16:00 CEST
SESSION S1M - P1
Power Electronics and Control in Smart Grids, Industry and e-Transportation - Part 1
Room: Room 3
Chairs: Giuseppe Schettino, *University of Palermo, Italy*
Alfonso Damiano, *Università di Cagliari, Italy*
Hadi Y. Kanaan, *Saint-Joseph University of Beirut, Lebanon*

14:00 **INVITED - Advanced Wireless Charging Solutions for Autonomous E-mobility and Future Transportation Electrification [ON-LINE]**
Sheldon S. Williamson, Ontario Tech University, Canada

14:30 **Design of a Smart Car Park With PV Generation and BESS for Grid-On and Grid-Off Operation. The SMARTEP Project**
Antonino Barberi, University of Palermo, Italy
Marco Beccali, University of Palermo, Italy
Marina Bonomolo, University of Palermo, Italy
Salvatore Favuzza, University of Palermo, Italy
Valerio Lo Brano, University of Palermo, Italy
Rossano Musca, University of Palermo, Italy
Cristenzio Provenzano, University of Palermo, Italy
Gaetano Zizzo, University of Palermo, Italy

14:45 **A Comparison Between RMS and EMT Grid-Forming Implementations in MATLAB/Simscape for Smart Grids Dynamics**
Salvatore Favuzza, University of Palermo, Italy
Rossano Musca, University of Palermo, Italy
Gaetano Zizzo, University of Palermo, Italy
Jaser Saed, Birzeit University, Palestine

15:00 **Comparative Studies on High-Power Density and Light-Weight Step-Up DC-DC Power Converter for Hydrogen-Fuel-Cell Hybrid System**
Sang Gyun Ryu, Korea National University of Transportation, Korea
Hyung Woo Lee, Korea National University of Transportation, Korea
Chan Bae Park, Korea National University of Transportation, Korea
Jae Bum Lee, Korea National University of Transportation, Korea
Jin Chul Kim, Korea National University of Transportation, Korea
Dong Kyun Kim, Korea National University of Transportation, Korea
Jae Hyeon Lim, Korea National University of Transportation, Korea

15:15   **Experimental Evaluation of Dead-Time Impacts on the Efficiency and THD for a Three-Phase Five-Level Cascaded H-Bridge Inverter**

Giuseppe Schettino, University of Palermo, Italy
Claudio Nevoloso, University of Palermo, Italy
Rosario Miceli, University of Palermo, Italy
Gioacchino Scaglione, University of Palermo, Italy
Antonino Oscar Di Tommaso, University of Palermo, Italy
Fabio Viola, University of Palermo, Italy
Concettina Buccella, University of L'Aquila, Italy
M. Gabriella Cimoroni, University of L'Aquila, Italy

15:30   **Accurate Frequency Estimation of Electrical Waveforms Affected by Harmonics and Interharmonics**

Daniel Belega, University of Timisoara, Romania
Dario Petri, University of Trento, Italy

15:45   **Design and Comparison Between PSFB and LLC 400/48V DC/DC Stages for On-Board Battery Charger During Total and Partial CC-CV Charging Cycles**

Alessandro Campanini, University of Bologna, Italy
Mattia Simonazzi, University of Bologna, Italy
Marco Bosi, University of Bologna, Italy
Claudio Rossi, University of Bologna, Italy

14:00 - 16:00 CEST
SESSION S3F
Advances in Medical Informatics for HealthCare Applications
Room: Room 4
Chairs: Dagmar Krefting, *University Medical Center, Germany*
Silvana Quaglini, *University of Pavia, Italy*

14:00   **Taking a Walk Avoiding Polluted Routes: An Application to a Virtual Coach for Cancer**

Cosimo Strusi, University of Pavia, Italy
Arianna Dagliati, University of Pavia, Italy
Daniele Pala, University of Pavia, Italy
Cristiana Larizza, University of Pavia, Italy
Riccardo Bellazzi, University of Pavia, Italy
Silvana Quaglini, University of Pavia, Italy

14:15 **Designing a Testing Environment for the CAPABLE Telemonitoring and Coaching Platform**

Giordano Lanzola, University of Pavia, Italy
Francesca Polce, University of Pavia, Italy
Valentina Tibollo, IRCCS Istituti Clinici Scientifici Maugeri, Italy
Silvana Quaglini, University of Pavia, Italy
Szymon Wilk, Poznan University of Technology, Poland

14:30 **Automatic Detection of COVID-19 Pneumonia in Chest Computed Tomography Scans Using Convolutional Neural Networks**

Neil Micallef, University of Malta, Malta
Carl J. Debono, University of Malta, Malta
Dylan Seychell, University of Malta, Malta
Conrad A Attard, University of Malta, Malta

14:45 **PROper-Net: A Deep-Learning Approach for Prostate's Peripheral Zone Segmentation Based on MR Imaging**

Eugenia Mylona, University of Ioannina, FORTH-IMBB, Greece
Dimitris Zaridis, University of Ioannina, Greece
Nikolaos Tachos, Unit of Medical Technology and Intelligent Information Systems, Greece
Kostas Marias, FORTH, Greece
Manolis Tsiknakis, Hellenic Mediterranean University, FORTH - ICS, Greece
Dimitris Fotiadis, Institute of Molecular Biology and Biotechnology, FORTH, University of Ioannina, Greece

15:00 **Perceived Stress Analysis of Undergraduate Students During COVID-19: A Machine Learning Approach** [ON-LINE]

Ahnaf Akif Rahman, Islamic University of Technology, Bangladesh
Muntequa Imtiaz Siraji, Islamic University of Technology, Bangladesh
Lamim Ibtisam Khalid, Islamic University of Technology, Bangladesh
Fahim Faisal, Islamic University of Technology, Bangladesh
Mirza Muntasir Nishat, Islamic University of Technology, Bangladesh
Ashik Ahmed, Islamic University of Technology, Bangladesh
Md Abdullah Al Mamun, Islamic University of Technology, Bangladesh

15:15 **Can Machine Learning Predict Mortality in Myocardial Infarction Patients Within Several Hours of Hospitalization? A Comparative Analysis**

Christopher Farah, American University of Beirut, Lebanon
Yasmine Abu Adla, American University of Beirut, Lebanon
Mariette Awad, American University of Beirut, Lebanon

15:30 **A Cost-Effective Eye-Tracker for Early Detection of Mild Cognitive Impairment**
Danilo Greco, University of Genova, Italy
Francesco Masulli, University of Genova, Italy
Stefano Rovetta, University of Genova, Italy
Alberto Cabri, University of Genova, Italy
Davide Daffonchio, University of Genova, Italy

15:45 **Prediction of the 3D Spinal Alignment From External Shape of the Back in AIS Patients Using Regression Model**
Stefano Caturano, Sapienza University of Rome, Italy
Mirko Kaiser, ETH Zurich, Switzerland
Martin Bertsch, Bern University of Applied Sciences, Switzerland
Tito Bassani, IRCCS Istituto Ortopedico Galeazzi, Italy
William Taylor, ETH Zurich, Switzerland
Sasa Cukovic, ETH Zurich, Switzerland

14:00 - 16:00 CEST
SESSION S4F
IoT and Smart Communications
Room: Room 5
Chairs: Ali Balador, *RISE, Sweden*
Francesco Flammini, *Mälardalen University, Sweden*
Nicolò De Carli, *CNR-IEIIT, Italy*

14:00 **Personalized Outsourced Privacy-Preserving Database Updates for Crowd-Sensed Dynamic Spectrum Access** [ON-LINE]
Laura Truong, St. John's University, USA
Erald Troja, St. John's University, USA
Nikhil Yadav, St. John's University, USA
Syed Ahmad Chan Bukhari, St. John's University, USA
Mehrdad Aliasgari, California State University, USA

14:15 **Container-Based Load Balancing and Monitoring Approach in Fog Computing System** [ON-LINE]
Tina Samizadeh Nikoui, Science and Research Branch, Islamic Azad University, Iran
Amir Masoud Rahmani, National Yunlin University of Science and Technology, Taiwan
Ali Balador, RISE Research Institute, Sweden
Hooman Tabarsaied, South Branch of Islamic Azad University, Iran

14:30 **A Cost-Aware Resource Management Technique for Cloud and Edge Environment** [ON-LINE]

Hamie Ebrahimiyan, Urmia University, Iran
Ali Balador, RISE Research Institute, Sweden
Tina Samizadeh Nikoui, Science and Research Branch, Islamic Azad University, Iran

14:45 **Path Asymmetry Reconstruction via Deep Learning** [ON-LINE]

Nada Alhashmi, Khalifa University, United Arab Emirates
Nawaf Almoosa, Khalifa University, United Arab Emirates
Gabriele Gianini, Università degli Studi di Milano, Italy, Khalifa University, United Arab Emirates

15:00 **Combining Learners to Predict Link Quality in Wireless IoT Networks** [ON-LINE]

Miguel Landry Foko Sindjoung, University of Limpopo, South Africa
Mthulisi Velempini, University of Limpopo, South Africa
Pascale Minet, INRIA Paris, France

15:15 **Learning-Automata-Based Hybrid Model for Event Detection in LoRaWAN Networks** [ON-LINE]

Athanasios Tsakmakis, Aristotle University of Thessaloniki, Greece
Anastasios Valkanis, Aristotle University of Thessaloniki, Greece
Georgia Beletsioti, Aristotle University of Thessaloniki, Greece
Konstantinos Kantelis, Aristotle University of Thessaloniki, Greece
Petros Nicopolitidis, Aristotle University of Thessaloniki, Greece
Georgios Papadimitriou, Aristotle University of Thessaloniki, Greece

15:30 **Sentiment Analysis and Recurrent Radial Basis Function Network for Bitcoin Price Prediction** [ON-LINE]

Mario Casillo, University of Salerno, Italy
Marco Lombardi, University of Salerno, Italy
Angelo Lorusso, University of Salerno, Italy
Francesco Marongiu, University of Salerno, Italy
Domenico Santaniello, University of Salerno, Italy
Carmine Valentino, University of Salerno, Italy

15:45 **Predictive preservation of historic buildings through IoT-based system** [ON-LINE]

Mario Casillo, University of Salerno Italy
Caterina Gabriella Guida, University of Salerno Italy
Marco Lombardi, University of Salerno Italy
Angelo Lorusso, University of Salerno Italy
Francesco Marongiu, University of Salerno Italy
Domenico Santaniello, University of Salerno Italy

14:00 - 15:30 CEST
SESSION S4G
Smart Living Technologies
Room: Room 6
Chairs: Riccardo Bassoli, *TU Dresden, Germany*
Juan A. Cabrera Guerrero, *TU Dresden, Germany*

14:00   **INVITED - Future communication networks: Quantum, Post Shannon & Computing** [ON-LINE]
Frank H. P. Fitzek, TU Dresden, Germany

14:30   **A Good Horse Only Jumps as High as Needed: Multi-Field Fulcrum Codes for Heterogeneous Decoders**
Vu Nguyen, Technical University of Dresden, Germany, Vietnam - Korea University of Information and Communication Technology, Vietnam
Juan A. Cabrera, Technical University of Dresden, Germany
Javier Acevedo, Technical University of Dresden, Germany
Christian Scheunert, Technical University of Dresden, Germany
Giang T. Nguyen, Technical University of Dresden, Germany
Frank H.P. Fitzek, Technical University of Dresden, ComNets, Germany

14:45   **MC NFV: Molecular Communication NFV in 6G Networks** [ON-LINE]
Pit Hofmann, Technical University of Dresden, Germany
Riccardo Bassoli, Technical University of Dresden, Germany
Frank H.P. Fitzek, Technical University of Dresden, ComNets, Germany
Martin Reisslein, Arizona State University, USA

15:00   **Evaluation of an Intelligent Task Scheduling Algorithm for 6G 3D Networking**
Jiajing Zhang, Technical University of Dresden, Germany
Huanzhuo Wu, Technical University of Dresden, Germany
Shiwei Shen, Technical University of Dresden, Germany
Riccardo Bassoli, Technical University of Dresden, Germany
Giang T. Nguyen, Technical University of Dresden, Germany
Frank H.P. Fitzek, Technical University of Dresden, ComNets, Germany

15:15   **You Only Hear Once: Lightweight In-Network AI Design for Multi-Object Anomaly Detection**
Huanzhuo Wu, Technical University of Dresden, Germany
Jia He, Technical University of Dresden, Germany
Máté Tömösközi, Technical University of Dresden, Germany
Jiajing Zhang, Technical University of Dresden, Germany
Frank H.P. Fitzek, Technical University of Dresden, Germany

16:00 - 16:30
COFFEE BREAK
Room: University of Palermo - Dipartimento di Ingegneria - Building 19

16:30 - 18:00 CEST
SESSION S1M - P2
Power Electronics and Control in Smart Grids, Industry and e-Transportation - Part 2
Room: Room 3
Chairs: Giuseppe Schettino, *University of Palermo, Italy*
Concettina Buccella, *University of L'Aquila, Italy*

16:30   **Power Flow Numerical Assessment of a STATCOM iUPQC Utility Interface for Microgrids with STATCOM and PAC Functions** [ON-LINE]

Matheus Montagner, Santa Catarina State University, WEG Drives and Controls, Brazil
Marcello Mezaroba, Santa Catarina State University, Brazil
Cassiano Rech, Universidade Federal de Santa Maria, Brazil
Eduardo B. dos Prazeres, Santa Catarina State University, Brazil
Douglas Aguiar do Nascimento, University of Zielona Gora, Poland & University of Twente, The Netherlands
Hermes Loschi, University of Notthingham, United Kingdom

16:45   **Finite Set Model Predictive Control of Three Phase 2L-VSC for Grid Connected Photovoltaic System** [ON-LINE]

Mohammed Tebaa, Mohammed V University in Rabat, Morocco
Mohammed Ouassaid, Mohammed V University in Rabat, Morocco

17:00   **Investigation on Selective Harmonic Elimination in Unbalanced Multilevel Inverters**

Concettina Buccella, University of L'Aquila, Italy
M. Gabriella Cimoroni, University of L'Aquila, Italy
Carlo Cecati, University of L'Aquila, Italy
Antonino Oscar Di Tommaso, University of Palermo, Italy
Claudio Nevoloso, University of Palermo, Italy
Giuseppe Schettino, University of Palermo, Italy
Santolo Meo, University of Naples Federico II, Italy

17:15   **Machine Learning for Model Predictive Control of Cascaded H-Bridge Inverters**

Francesco Simonetti, University of L'Aquila, Italy
Giovanni Domenico Di Girolamo, University of L'Aquila, Italy

Alessandro D'Innocenzo, University of L'Aquila, Italy
Carlo Cecati, University of L'Aquila, Italy

17:30 **Estimation of Model Order for Electromechanical Modes Using Sequential K-Mean Algorithm**
Jangam Sandeep, National Institute of Technology, Rourkela, India
Shekha Rai, National Institute of Technology, Rourkela, India

17:45 **Active Chaos to Control Energy Flows in Complex Networks of Oscillators** [ON-LINE]
Maide Bucolo, University of Catania, Italy
Arturo Buscarino, University of Catania, Italy
Luigi Fortuna, University of Catania, Italy
Giuseppe La Spina, University of Catania, Italy

16:30 - 17:45 CEST
SESSION S3G
Bio-electromagnetic modelling
Room: Room 4
Chairs: Paolo Ravazzani, *IEIIT, CNR, Milano, Italy*
Patrizia Lamberti, *DIEM, University of Salerno, Italy*

16:30 **Computational Techniques in Bio-Electromagnetics: Theory and Perspectives**
Serena Fiocchi, National Research Council, IEIIT, Italy
Emma Chiaramello, National Research Council, IEIIT, Italy
Marta Bonato, National Research Council, IEIIT, Italy
Silvia Gallucci, National Research Council, IEIIT, Italy
Martina Benini, National Research Council, IEIIT, Italy
Gabriella Tognola, National Research Council, IEIIT, Italy
Laura Dossi, National Research Council, IEIIT, Italy
Marta Parazzini, National Research Council, IEIIT, Italy
Paolo Ravazzani, National Research Council, IEIIT, Italy

16:45 **Electric Scalar Potential Estimations for Non-Invasive Brain Activity Detection Through Multinode Shepard Method**
Francesco Dell'Accio, University of Calabria, Italy
Filomena Di Tommaso, University of Calabria, Italy
Guido Ala, University of Palermo, Italy
Elisa Francomano, University of Palermo, Italy

17:00 **Magnetic Field Effects on the Binding Site of A2A Receptor: An Insight Based on Atomistic Simulations**
Federico Del Signore, Sapienza University of Rome, Italy

Paolo Marracino, Rise Technology srl Rome, Italy
Davide Cocco, Sapienza University of Rome, Italy
Stefania Setti, IGEA SPA, Italy
Simona Salati, IGEA SPA, Italy
Ruggero Cadossi, IGEA SPA, Italy
Micaela Liberti, Sapienza University of Rome, Italy
Francesca Apollonio, Sapienza University of Rome, Italy

17:15 **Improved Anatomical Female Breast Model: 3D Realization and Its Application to Numerical Plane Wave Exposure**
Noemi Dolciotti, Sapienza University of Rome, Italy
Micol Colella, Sapienza University of Rome, Italy
Simona D'Agostino, Sapienza University of Rome, Italy
Francesca Apollonio, Sapienza University of Rome, Italy
Micaela Liberti, Sapienza University of Rome, Italy

17:30 **Automated Needle Localisation for Electric Field Computation During an Electroporation Ablation**
Eloise Julia Rose Inacio, University of Bordeaux, France
Luc Lafitte, University of Bordeaux, France
Olivier Sutter, University Hospital Paris Seine Saint Denis, France
Olivier Seror, University Hospital Paris Seine Saint Denis, France
Baudouin Denis de Senneville, University of Bordeaux, France
Clair Poignard, University of Bordeaux, France

18:00 - 18:30
CLOSING SESSION - AWARD CEREMONY
Room: Room 1