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1. GENERAL CHAIRS MESSAGE



Pascal Lorenz
University of Haute Alsace
France



Sandro Nižetić
University of Split
Croatia



Antonio Jara
University of Applied Sciences
Western Switzerland (HEVS-HES-
SO) & HOP Ubiquitous
Switzerland

Dear participants of SpliTech Conference,

it is our pleasure to welcome you to SpliTech 2017 conference. We are proud to take the role of general chairs in the conference gathering both industry and academia in the popular topics of eHealth, Smart City/Environment, Energy and Engineering Modelling. Given topics make a vital role in everyday life, where academic approaches represent the pool of knowledge, ideas and smart solutions for every person and every industry empowering them to reach their full potential.

Special thanks goes to the keynotes, invited speakers, technical program committee, session chairs, reviewers and finally authors. In the end, we would like to thank all organization team for their efforts and devoted time!

The 2nd International Multidisciplinary Conference on Computer and Energy Science (SpliTech 2017), co-sponsored by the IEEE Communications Society, will be held in the beautiful historical city of Split, and we wish to welcome you to the beautiful city of Split and we are sure that you will enjoy your time during the conference!

Pascal Lorenz,

Sandro Nižetić,

Antonio Jara

General chairs

2. TECHNICAL PROGRAM CHAIR MESSAGE



Joel J.P.C. Rodrigues
National Institute of Telecommunications (Inatel)
Brasil

2nd International Multidisciplinary Conference on Computer and Energy Science 2017 will be held in Univesity of Split, FESB, Croatia, July 12 – 14 2017.

To start new conference nowadays is a big challenge and it is much bigger challenge to maintain it successfully through the upcoming years. However, looking at the conference program, we can be proud with the outcome - the conference succeeded in combining the industry with academia, where sharing experiences in the hottest topics of today: e-Health, Smart City/Environment, IoT, Energy, and Engineering Modelling for different purposes is of great importance for building future, better world. The conference received total of 102 contributions, while 50 of them where accepted within the technical program, with acceptance rate of 49%, by following IEEE rules of acceptance rate and thus assuring the quality. Each paper was reviewed by at least three independent reviewers, and I use this opportunity to thank all reviewers and Technical Program Committee Members for tremendous efforts involved in the review process, while being strongly suggestive and thus helping Authors to improve their contributions. We have also ensured distinguished keynote and invited speakers from general conference tracks in order to ensure top quality of the conference programme. We wish you a pleasant time in Split, at the host FESB, and successful SpliTech 2017! Thank you for being a part of this event!



Joel J.P.C. Rodrigues

Technical Program Committee Chair

3. COMMITTEES

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Neven Duić	University of Zagreb, Croatia

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Sandro Nižetć	University of Split, Croatia

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Technical Program Chair

Joel J.P.C. Rodrigues	National Institute of Telecommunications (Inatel), Brasil
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Smart City/Environment Track Chairs

Mario Čagalj	University of Split, Croatia
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Vedrana Cvitanić, University of Split, Croatia
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Duje Čoko, University of Split, Croatia
Ivo Čolak, University of Mostar, Bosnia and Herzegovina
Vicko Dorić, University of Split, Croatia
Pasquale Dottorato, LAB ID Bologna, Italy

Khalil El Khamlichi Drissi, Blaise Pascal University, France
Natalija Filipović, University of Split, Croatia
Rajit Gadh, University of California Los Angeles (UCLA), USA
Mirela Galić, University of Split, Croatia
Jose Vicente García Ortiz, University of Florida, Spain
Tonko Garma, University of Split, Croatia
Giuseppe Ghisa, Istituto Poligrafico e Zecca dello Stato (IPZS), Italy
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Sandra Kostić, University of Split, Croatia

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 Dino Lovrić, University of Split, Croatia
 Željko Lozina, University of Split, Croatia
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 George Manos, Aristotle University of Thessaloniki, Greece
 Josip Maras, University of Split, Croatia
 Ivan Marasović, University of Split, Croatia
 Snježana Mardešić, University of Split, Croatia
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 Nicoletta Saulig, University of Rijeka, Croatia
 Dainel Rolph, Schnieder, University of Zagreb, Croatia
 Bernhard Schrefler, University of Padova, Italy
 Pritee Sharma, Indian Institute of Technology Indore, India
 Benson Shing, University of California San Diego, USA
 Čedomir Stefanović, Aalborg University, Denmark
 Vincenzo Stornelli, University of L'Aquila, Italy
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 Petar Šolić, University of Split, Croatia
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 Antonio Vilei, STMicroElectronics Lecce, Italy
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 Dejan Vukobratović, University of Novi Sad, Serbia
 Katarina Vukojević, University of Split, Croatia
 Da Yan, Tsinghua University, China
 Jesus Alonso Zarate, CCTC, Spain
 Bin Zhao, Tsinghua University, China
 Tea Žakula, University of Zagreb, Croatia
 Zlatko Živković, University of Split, Croatia

PROFESSIONAL PROGRAM CHAIR

Luigi Patrono University of Salento, Italy

LOCAL ORGANIZING COMMITTEE CHAIRS

Petar Šolić University of Split, Croatia (conference secretary), splitech@fesb.hr

Toni Perković University of Split, Croatia

Nikolina Batarelo, University of Split, Croatia
 Dario Bezmalinović, University of Split, Croatia
 Duje Čoko, University of Split, Croatia
 Andrija Džimbeg, University of Split, Croatia
 Nikolina Goleš, University of Split, Croatia
 Filip Grubišić Čabo, University of Split, Croatia
 Ante Krietić, University of Split, Croatia
 Josip Maras, University of Split, Croatia

Ivan Marasović, University of Split, Croatia
 Tea Marasović, University of Split, Croatia
 Sandro Nižetić, University of Split, Croatia
 Željko Penga, University of Split, Croatia
 Ivan Pivac, University of Split, Croatia
 Marina Prvan, University of Split, Croatia
 Ivan Tolj, University of Split, Croatia

WEB CHAIR

Željka Milanović University of Split, Croatia

4. FINAL PROGRAM OUTLINE

Wednesday, July 12, 2017 (location: Split, FESB)

08.30 - 15.00 *Registration*

10.00 - 10.30 *Coffee break*

10.30 - 12.00 *Technical program, Professional program*

Lunch time

13.30 - 15.00 *Technical program, Professional program*

Thursday, July 13, 2017 (location: Split, FESB)

07.30 - 17.30 *Registration*

08.30 - 09.00 *Invited talk*

08.30 - 11.00 *IoT: Presentations and Exhibition*

09.00 - 10.30 *Technical program, HEP ESCO: Open days*

10.30 - 11.00 *Coffee break*

11.00 - 12.30 *Opening ceremony, Keynote speeches*

Lunch time

13.30 - 15.00 *Technical program, IoT symposium, Tutorial,*

15.00 - 15.30 *Coffee break*

15.30 - 17.00 *IoT symposium, Invited talks*

17.00 - 17.30 *Invited talks, Hydrogen Laboratory Visit*

18.30 *Bus transfer to the City Centre, Guided tour of Split*

20.45 *Conference dinner and cocktails in "Vila Dalmacija"*

Friday, July 14, 2017 (location: Split, FESB)

08.30 - 11.00 *Registration*

09.00 - 09.30 *Invited talk*

09.30 - 11.00 *Technical program, IoT symposium*

11.00 - 11.30 *Coffee break*

11.30 - 13.00 *Professional program, Invited talk, Smart city: Round table*

Lunch time & Best paper award ceremony

**Petar Popovski***Aalborg University, Denmark***Wireless Communication Challenges in 5G towards Transforming Vertical Industries**

While the previous generations of mobile communications were focused on providing high rates and seamless connectivity for the user, 5G is poised to change the vertical industries, such as energy, transport, industrial production, and health. There is a common consensus that 5G will consist of three different modes: extended Mobile Broadband (eMBB), Machine-Type Communication (mMTC) and Ultra-Reliable Low-Latency Communication (URLLC). With mMTC, the vertical industries get access to data from massive amount of sensors and unprecedented insights in e.g. energy infrastructure or supply chain. URLLC represents one of the most innovative features of 5G, enabling mission-critical communications, such as reliable remote action with robots or coordination among vehicles. The value brought by URLLC can be understood as follows: Once a vertical industry can safely assume that wireless connectivity is “truly anywhere and anytime” and can be guaranteed e.g. >99.999% of the time, the approach to system design and operation changes fundamentally. This talk will introduce challenges faced by wireless communication on the path of creating 5G and transforming the current vertical industries into connected, fully digital verticals. It will present the fundamental tradeoffs that exist in designing the modes URLLC and mMTC, as well as architectures for supporting those services along with the extremely high rates offered by eMBB.

Petar Popovski is a professor at Aalborg University. He received his dipl.ing. (1997)/Magister Ing. (2000) in communication engineering from Sts. Cyril and Methodius University, Skopje, Republic of Macedonia, and his Ph. D. from Aalborg University (2004). In 2015 he received an ERC Consolidator Grant and in 2016 he received the IEEE Fred W. Ellersick award. He currently serves as an Area Editor for IEEE Transactions on Wireless Communications. His research interests are in wireless communications/networks, communication theory, 5G systems and communication for the Internet of Things.

**Jiří Jaromír Klemeš**

*Brno University of Technology - VUT Brno, Czech Republic and
Pázmány Péter Catholic University, Budapest, Hungary*

Energy and Process Integration Research: Present Situation and Development Trends in Future Research

Energy supply and its efficient use in production are key to ensuring the healthy functioning of the world economies. Based on that, to ensure sustainability, the supply and use of energy have to apply the principle of minimising negative environmental impacts and even improving the environment through net-regenerative development. In this context, ensuring cleaner energy is the cornerstone for cleaner production, especially for reducing the emissions of greenhouse gases and other pollutants, which are directly related to the types and loads of the energy sources used. This introduction presents a review of the main lessons recently learned in the area of more efficient energy use, cleaner fuels and biofuels, cleaner production, CO₂ capture, optimisation and waste management. This presentation provides ideas and technologies that can be incorporated into real-world solutions and can serve as the foundations for future research. The wide topical coverage and the high quality would provide directions for future collaborative research— including process level emission minimisation, self-sufficient regions, and industrial symbiosis for optimising usage of waste heat and waste material flows. The scope covers the extensions of the Pinch Analysis for process modifications of individual processes to total site heat integration (TSHI). The Plus–Minus principle has been adapted to enable the beneficial process modification options to be selected in order to maximise energy savings in TSHI. The Total Site Profile (TSP) is divided into three regions: (a) the region of the horizontal overlap between the Site Sink and Source Profiles, (b) the horizontal overlap region and (c) below the horizontal overlap region. The proposed methodology identifies the options to reduce utility targets in these regions using the TSP, Site Utility Composite Curves (SCC), Utility Grand Composite Curve (UGCC), modified Problem Table Algorithm (PTA), Total Site Problem Table Algorithm (TS-PTA) and some new heuristics. The identified changes on the TSP are then linked to the specific changes in the individual processes. The illustrative case study shows that the Plus–Minus principle application in the TSHI context can further improve heat recovery. The proposed spreadsheet-based methodology combines the advantages of graphical visualisation, as well as the numerical precision. Several real-life industrial case studies are presented as well.

Previously the Project Director, Senior Project Officer and Hon Reader at Department of Process Integration at UMIST, The University of Manchester and University of Edinburgh. Founder and a long term Head of the Centre for Process Integration and Intensification – CPI², University of Pannonia, Veszprém, Hungary. Awarded by the EC with Marie Curies Chair of Excellence (EXC). Track record of managing and coordinating 91 major EC, NATO and UK Know-How projects. Research funding attracted over 21 M€. Co-Editor-in-Chief of Journal of Cleaner Production. He authored nearly 400 papers, h-index 40. A number of books published by McGraw-Hill; Woodhead; Elsevier; Ashgate Publishing Cambridge; Springer; WILEY-VCH; Taylor & Francis). Chairperson of CAPE Working Party of EFCE, a member of WP on Process Intensification and of the EFCE Sustainability platform. Several times Distinguished Visiting Professor for Universiti Teknologi Malaysia, Xi'an Jiaotong University; South China University of Technology, Guangzhou; Tianjin University in China; University of Maribor, Slovenia; University Technology Petronas, Malaysia; Brno University of Technology and the Russian Mendeleev University of Chemical Technology, Moscow. Doctor Honoris Causa of Kharkiv National University "Kharkiv Polytechnic Institute" in Ukraine, the University of Maribor in Slovenia, University POLITEHNICA Bucharest, Romania. "Honorary Doctor of Engineering Universiti Teknologi Malaysia", "Honorary Membership of Czech Society of Chemical Engineering", "European Federation of Chemical Engineering (EFCE) Life-Time Achievements Award" and "Pro Universitaire Pannonica" Gold Medal.

6. INVITED SPEAKERS

INVITED SPEAKER

Thursday, July 13

08:30 - 09:00 (Great Hall)

ENERGY TRACK



Vlasta Zanki

HEP ESCO d.o.o., Croatia

Challenges Development of energy services in the digital technology era

Global and EU energy markets evolve rapidly, pursuing the technological, political and market demands. Utilities and energy services are striving to keep up with this trend by putting a greater focus on customer needs and by seeking new business models. These new trends on energy market will be presented, with an emphasis on services that will be offered by HEP ESCO to the customers of the HEP group in the coming period. The presentation will focus on smart technologies and new concepts, such as smart buildings and industry 4.0. Preparation of project for EU funding will be given special attention, particularly those that are currently being developed in the industry sector.

Ms Zanki graduated from the department of Process Engineering at Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb and obtained her BSc degree in 1998. She was awarded the degree of MSc in Technical Sciences in 2002 at the international post graduate studies for "Sustainable Energy Engineering" at the Energy Institute of the Royal Institute of Technology (KTH) in Stockholm, Sweden. Ms Zanki successfully completed her PhD studies at KTH in 2016. She also completed a number of the professional trainings and courses including: training for refrigerants management in Cuffley, Great Britain with the purpose of establishing a laboratory in accordance with HRN EN ISO/IEC 17025 at the Faculty of Mechanical Engineering, courses for energy advisor and project management in United Nations Development Programme (UNDP), course for energy certification (Module 1) at Faculty of Mechanical Engineering and course for EU Project Manager at the Experta Business Academy. From 1998 to 2007 Ms Zanki was a Junior Research Assistant at the Institute for thermodynamics, thermal and process engineering, while from 2006 to 2012, Ms Zanki was employed in UNDP, firstly as a National Consultant for HVAC systems and later as a Project Manager for the Government Programme "Bringing your House in Order". In May 2012, Ms Zanki was appointed Managing Director of HEP ESCO. Ms Zanki wrote a number of scientific and professional articles and papers and participated as an editor and author in six publications (books, manuals and brochures) in the area of energy efficiency. Ms Zanki is Vice President of the Presidency of Croatia Green Building Council and the President of the Energy Council of the Primorsko-goranska county. Ms Zanki is also one of founders of the Croatian Association for cooling and air-conditioning engineering and heat pumps. Ms Zanki received a number of respectable awards and recognitions.

**Ned Djilali***University of Victoria, Canada***Computational Modelling of Fuel Cell Electrodes**

Fuel cells are efficient electrochemical energy conversion devices that can provide zero emission power for applications ranging from portable electronics and road vehicles, to residential power generation. They have the advantages of high energy density, fast start-up, and scalability. A key component of a fuel cell is the electrode, which facilitates the electrochemical reaction and the transport of reactants, charge, and byproduct heat and water. Fuel cell electrodes consist of three tightly integrated layers having distinct characteristics: a catalyst layer, a micro-porous layer, and a gas diffusion layer. The complex porous structure and morphology of the layers largely determine the effectiveness of the transport processes and in turn the overall performance, cost and durability of a fuel cell. For instance, when operating at higher current densities, or when local water and heat management are inadequate, water condensation leads to the formation of liquid water that "floods" the pores of the electrode, thus impeding the transport of reactant gases. This not only reduces performance but can also promote physico-chemical degradation processes. In this talk we will discuss some of the challenges and progress toward modelling and understanding the multiphysics, multiscale transport in the various porous layers of PEM fuel cells through a combination of advanced microscopy, numerical reconstruction, and pore scale simulations. We will also present some recent progress in the modelling and simulation of the fabrication process that determines the structure and morphology of porous catalyst layers.

Ned Djilali is Professor of Mechanical Engineering at the University of Victoria, where he holds the Canada Research Chair in Advanced Energy Systems Design and Computational Modelling. His research focuses on transport phenomena (fluid flow, heat, mass and charge transport) and energy systems analysis. The applications of this research have ranged from aerodynamics and zero-emission vehicles, to electrochemical energy conversion and the water-energy nexus. Prior to joining UVic, he was staff specialist with the Advanced Aerodynamics Department at Bombardier Inc., where he worked on the design of the Regional Jet. At UVic he has established an internationally recognized laboratory in the areas of thermofluid science, fuel cell technology and energy systems where he has trained many graduates who have become leaders in academia and industry. Djilali has served as Director of UVic's Institute for Integrated Energy Systems and of the Pacific Institute for Climate Solutions, and was engaged in several initiatives including the BC Hydrogen & Fuel Cell Industry Strategy and the Hydrogen Highway deployed as part of the 2010 Winter Olympics. He has advised and collaborated with numerous industry partners, organizations and government agencies, including Toyota, Mercedes-Benz, Ballard, the BC Climate Action Secretariat, and the Wind Energy Strategic Network on the development and adoption of zero emission energy technologies, and has held visiting professorships at various institutions in Asia, Europe and North-America. Djilali lectures widely on various aspects of sustainable energy systems, has published over 170 peer reviewed journal papers, holds 14 patents, and serves on the editorial boards of several international journals. He is a Thomson-Reuters Highly Cited Researcher, and a Fellow of the Canadian Society for Mechanical Engineering, the Canadian Academy of Engineering, and the Royal Society of Canada.

**Frano Barbir***University of Split, Croatia***Status of fuel cell technologies and their applications**

Fuel cells are devices that convert chemical energy of fuel by electrochemical reactions directly to electricity. Although the operating principle of fuel cells was discovered in XIX century, their intensive development takes place during the last 20 years. Based on the type of electrolyte there are several types of fuel cells, but the most developed are so called Proton Exchange Membrane or Polymer Electrolyte Membrane (PEM) fuel cells. In this presentatin development of PEM fuel cells and their components (membranes, catalysts, bipolar plates, flow fields) and their applications is presented. Besides development of materials for above listed components, research and development activities include investigations of performance degradatation with time, modeling of processes inside a fuel cell (electrochemical reactions, heat and mass transport, proton conduction, fluid flow, etc.) and development of advanced diagnostic methods for better understanding of the key processes inside a fuel cell as well as for operation control purposes. Fuel cells have a wide variety of applications – from those small power levels, order of magnitude 1 W, as battery replacement, to portable and stationary power generation and cogeneration, to propulsion of various vehicles (bicycles, scooters, cars, buses, trains and even airplanes). Use in cars gets most of attention, because the fuel cell powered vehicles are beginning to be manufactured in small series and sold commercially.

Frano Barbir is Professor and Chair of Thermodynamics at Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, University of Split, Croatia. He has been actively involved in hydrogen and fuel cell technology R&D, engineering and applications since 1989, working in U.S. as a researcher and R&D manager in both industry (Energy Partners, Proton Energy Systems) and universities (University of Miami, University of Connecticut), and in Turkey as the Associate Director of Science and Technology of the UNIDO – International Center for Hydrogen Energy Technologies. His research interests include heat and mass transfer in PEM fuel cells, effects of operational conditions on fuel cell performance and durability, design of fuel cells and fuel cell stacks and systems, fuel cell applications, and hydrogen energy concept and its role in context of energy future. He has authored and/or co-authored more than 200 papers on hydrogen and fuel cells published in scientific and technical journals, books, encyclopedias, and conference proceedings, as well as 7 U.S. patents on various aspects fuel cell stack and system design and operation. His book, PEM Fuel Cells: Theory and Practice, published by Elsevier/Academic Press in 2005 (2nd edition came out in 2013), is being used as a textbook at many universities all over the world. He serves on the Board of Directors of the International Association of Hydrogen Energy, and he is the Emeritus Editor of the International Journal of Hydrogen Energy. Prof. Barbir holds a Dipl.-Ing. degree in mechanical engineering and an M.Sc. degree in chemical engineering both from University of Zagreb, Croatia, and a Ph.D. degree in mechanical engineering from University of Miami, Coral Gables, FL.

**Alain J. Kassab***University of Central Florida, Canada***Multiscale Computational Fluid Dynamics Modeling as an Aid to Surgical Planning – Some Applications to Palliative Treatment of Congenital Heart Disease**

Computational Fluid Dynamics (CFD) has evolved and matured over the past decades and is now a mainstay of engineering analysis applied pervasively in nearly all engineering disciplines. In the past decade, CFD is seen to be increasingly utilized as a tool in medical applications in device design and surgical treatment planning. In cardiovascular applications, a CT-scan or an MRI of a patient is utilized to extract the 3D geometry of the portion of the vasculature of interest using specialized medical segmentation software. Pulsatile hemodynamics are resolved in a multi-scale scheme by coupling 3D time-accurate CFD computations of the anatomical region of interest with a 0D lumped parameter electric circuit model of the unresolved peripheral vasculature that provides the driving time-dependent flow and pressure waveforms boundary conditions. Applications are presented of this multi-scale CFD strategy to surgical planning of palliative treatment of congenital heart disease.

Alain J. Kassab is UCF Pegasus Professor in the Department of Mechanical and Aerospace Engineering at the University of Central Florida (UCF) in Orlando Florida. He earned his BS in Engineering Science in 1982, his MS in Mechanical Engineering 1985, and his PhD in Mechanical Engineering in 1989 from the University of Florida. He has over 25 years of experience in research and development in computational heat transfer, computational fluid dynamics, inverse problems, boundary elements, meshless methods and bioengineering resulting in over 300 scientific publications. He has authored two books on boundary elements, contributed chapters on boundary elements in heat transfer in the Handbook of Numerical Heat Transfer and Advances in Heat Transfer. He has co-organized and co-edited 10 international conferences in boundary elements, meshless methods, and computational methods in engineering. He is a Fellow of the ASME and the Wessex Institute of Technology. He is Editor of the international journal Engineering Analysis with Boundary Elements, Associate Editor of Inverse Problems in Science and Engineering, and is a member of 3 journal editorial boards.

**Pascal Lorenz***University of Haute Alsace, France***Architectures of Next Generation Wireless Networks**

Emerging Internet Quality of Service (QoS) mechanisms are expected to enable wide spread use of real time services such as VoIP and videoconferencing. The "best effort" Internet delivery cannot be used for the new multimedia applications. New technologies and new standards are necessary to offer Quality of Service for these multimedia applications. Therefore new communication architectures integrate mechanisms allowing guaranteed QoS services as well as high rate communications. The service level agreement with a mobile Internet user is hard to satisfy, since there may not be enough resources available in some parts of the network the mobile user is moving into. The emerging Internet QoS architectures, differentiated services and integrated services, do not consider user mobility. QoS mechanisms enforce a differentiated sharing of bandwidth among services and users. Thus, there must be mechanisms available to identify traffic flows with different QoS parameters, and to make it possible to charge the users based on requested quality. The integration of fixed and mobile wireless access into IP networks presents a cost effective and efficient way to provide seamless end-to-end connectivity and ubiquitous access in a market where the demand for mobile Internet services has grown rapidly and predicted to generate billions of dollars in revenue.

Pascal Lorenz (lorenz@ieee.org) received his M.Sc. (1990) and Ph.D. (1994) from the University of Nancy, France. Between 1990 and 1995 he was a research engineer at WorldFIP Europe and at Alcatel-Alsthom. He is a professor at the University of Haute-Alsace, France, since 1995. His research interests include QoS, wireless networks and high-speed networks. He is the author/co-author of 3 books, 3 patents and 200 international publications in refereed journals and conferences. He was Technical Editor of the IEEE Communications Magazine Editorial Board (2000-2006), Chair of Vertical Issues in Communication Systems Technical Committee Cluster (2008-2009), Chair of the Communications Systems Integration and Modeling Technical Committee (2003-2009), Chair of the Communications Software Technical Committee (2008-2010) and Chair of the Technical Committee on Information Infrastructure and Networking (2016-2017). He has served as Co-Program Chair of IEEE WCNC'2012 and ICC'2004, Executive Vice-Chair of ICC'2017, tutorial chair of VTC'2013 Spring and WCNC'2010, track chair of PIMRC'2012, symposium Co-Chair at Globecom 2007-2011, ICC 2008-2010, ICC'2014 and '2016. He has served as Co-Guest Editor for special issues of IEEE Communications Magazine, Networks Magazine, Wireless Communications Magazine, Telecommunications Systems and LNCS. He is associate Editor for International Journal of Communication Systems (IJCS-Wiley), Journal on Security and Communication Networks (SCN-Wiley) and International Journal of Business Data Communications and Networking, Journal of Network and Computer Applications (JNCA-Elsevier). He is senior member of the IEEE, IARIA fellow and member of many international program committees. He has organized many conferences, chaired several technical sessions and gave tutorials at major international conferences. He was IEEE ComSoc Distinguished Lecturer Tour during 2013-2014.

**Giovanni Grasselli***University of Toronto, Canada***Understanding hydraulic fracturing and associate seismicity – Advanced 3D and 4D FDEM micromechanical modelling**

The development of low and ultra-low permeability resources (e.g., shale gas and shale oil) has brought geomechanics to assume a key role for their successful recovery. Especially given recent declines in fossil fuel prices, the industry requires novel and more efficient strategies for the management and exploitation of these resources. Advanced numerical simulations, such as those based on the hybrid finite-discrete element (FDEM) methodology, and innovative experimentations are leading to more reliable geomechanics-based approaches to seismic imaging and reservoir modelling. By providing physics-based understanding on how hydraulic fracturing mechanisms in tight reservoirs are influenced by geology and in-situ stresses, FDEM modelling technology has the potential to advance the frontiers in the interpretation of injection and production data, thus providing a clear process for the optimization of stimulation strategies. FDEM modelling approach can also provide industry with the necessary geomechanical insights and additional capabilities to interpret the monitored microseismicity and, possibly, to evaluate the potential risk associated with induced seismicity. Numerical modelling, coupled with sound experimental validations, can help, for example, operators to associate variations of seismic parameters, such as change in b- and D-values, to specific geological structures and fracture modes, and to better assess the role of critically-oriented fractures on stimulation and production plans.

Dr. Giovanni Grasselli is Professor and Foundation CMG Research Chair in Fundamental Petroleum Rock Physics and Rock Mechanics in the Department of Civil Engineering at the University of Toronto. His research focuses on hybrid finite-discrete element (FDEM) numerical technology, experimental visualization techniques and geomechanics principles applied to the study of hydraulic fracturing. He received the prestigious ISRM Rocha Medal (2004) for best thesis worldwide in rock mechanics and supervised two Rocha Medal winners (2015; 2017). Through the start-up company Geomechanica Inc., the FDEM technology is currently commercialized and translated to engineering practice.

**Antonio Jara**

University of Applied Sciences Western Switzerland (HEVS-HES-SO) & HOP Ubiquitous, Switzerland

Smart POIs: a new way to interact and live in smart cities

Smart POIs are strategic areas of interest, consisting of a set of Smart Spots (the specific point of connection) that send a URL and create a physical space of information where everyone approaching can collaborate through a smart phone. Therefore, Smart POIs connect physical objects or places with the smart phone to offer an interactive and multimedia experience. This technology allows to directly open a responsive Web App that contains information designed to answer a specific topic, including text, videos, images and any multimedia material. The devices work by proximity (20 meters) both outdoors and indoors. The solution is ready for outdoor environments with an enclosure resistant to inclement weather. Exterior enclosures look and feel offer a discreet and elegant design that matches the environment using natural materials. In addition, Smart Spots are followed by an identifying sign and a series of simple instructions to guide the user, in order to guarantee that they are able to enjoy the experience. Smart POIs have a multitude of possibilities for the tourism industry, such as filling the information gaps existing in the cities, and connecting the consumer with services and products related to the sector, proximity marketing, geographic targeting, and content broadcasting. Smart POIs technology is a disruptive innovation in the tourism sector that will facilitate and enhance the experience of visitors and citizens.

Antonio J. Jara; As. Prof. PostDoc at University of Applied Sciences Western Switzerland (HES-SO), vice-chair of the IEEE Communications Society Internet of Things Technical Committee, and founder of the Internet of Things startup HOP Ubiquitous S.L., He did his PhD (Cum Laude) at the Intelligent Systems and Telematics Research Group of the University of Murcia (UMU) from Spain in 2013. He received two M.S. (Hons. – valedictorian) degrees. Since 2007, he has been working on several projects related to IPv6, Security and WSNs in automation and healthcare. He is especially focused on the design and development of new protocols for security and mobility for Future Internet of things, which was the topic of his Ph.D. He did the transfer of the results from his PhD around Security in the American Company United Technologies (owner of OTIS, Carrier and several building automation and aerospace companies). Nowadays, he continues working on IPv6 technologies for the Internet of Things In areas such as security, heterogeneity integration and the application of IoT in sectors such as industry 4.0, energy, home automation and wearables. He has also carried out a Master in Business Administration (MBA). He has published over 100 international papers (>1250 citations, h: 17), As well he holds several patents in the IoT domain. Finally, he participates in several European Projects about Internet of Things (networking, security and intelligence distribution – fog computing) and applied Internet of Things (energy, industry 4.0 and wearables).



FESB, University of Split, Wednesday, July 12			
TIME/HALL	A103	A104	A105
09:00	REGISTRATION*		
10:00 - 10:30	Coffee Break		
10:30 - 12:00	S1: Smart City - Applications	P1: Energy 1	P2: Software and Applications
12:00 - 13:30	Lunch		
13:30 - 15:00	S2: Smart City - Hardware and Systems	S3: Engineering Modeling - Computational Electromagnetics	P3: Theory and Applications

FESB, University of Split, Thursday, July 13			
TIME/HALL	Great Hall	A102	Small Hall
08:30 - 09:00	Invited talk: Vlasta Zanki, "Development of energy services in the digital technology era" (Great Hall)		
09:00 - 10:30	HEP ESCO: Open Days (09:30 - 10:30)	IoT: Presentations and Exhibition (08:30 - 11:00)	S5: Energy - Energy Efficiency and Energy Conversion (Room: A103) S6: E-Health
10:30 - 11:00	Coffee Break		
11:00 - 12:30	OPENING CEREMONY		
	Keynote speeches (A100): Petar Popovski , <i>Wireless Communication Challenges in 5G towards Transforming Vertical Industries</i> Jiří Jaromír Klemeš , <i>Energy and Process Integration Research: Present Situation and Development Trends in Future Research</i>		
12:30 - 13:30	Lunch		
13:30 - 15:00	S4: Energy - Power Electronics and Smart Grid	IoT1: Internet of Things - Software and Health	Tutorial: Interaction of Humans with Electromagnetics Fields
15:00 - 15:30	Coffee Break		
15:30 - 17:00	Hydrogen day: Invited talks Ned Djilali, <i>Computational Modelling of Fuel Cell Electrodes</i> Frano Barbir, <i>Status of fuel cell technologies and their applications</i>	IoT2: Internet of Things - Hardware	Invited talk: Alain J. Kassab, <i>Multiscale Computational Fluid Dynamics Modeling as an aid to Surgical Planning</i>
17:00 - 17:30	Hydrogen day: Hydrogen Laboratory Visit	Invited talk: Pascal Lorenz, <i>Architectures of Next Generation Wireless Networks</i>	Invited talk: Giovanni Grasselli, <i>Understanding Hydraulic Fracturing and Associate Seismicity-Advanced 3D and 4D FDEM Micromechanical Modelling</i>
18:30	Bus to the City Centre and Guided Tour of Split		
20:45	Conference Dinner and Cocktails in "Vila Dalmacija"		

FESB, University of Split, Friday, July 14		
TIME/HALL	Great Hall	A104
09:00 - 09:30	Invited talk: Antonio Jara, <i>Smart POIs: a New Way to Interact and Live in Smart Cities</i> (Great Hall)	
09:30 - 11:00	IoT3: Internet of Things - Architectures	S7: Engineering Modeling - Applied Engineering Electromagnetics
11:00 - 11:30	Coffee Break	
11:30 - 13:00	Invited talk: Nuno Lopes, <i>Smart Cities for Sustainable Development</i> Smart City: Round Table	P4: Energy 2
13:00	Lunch and Best paper award ceremony	

*Registration: Wednesday (09:00 - 15:00), Thursday (07:30 - 17:30), Friday (08:30 - 11:00)

**Nuno Lopes***University of Minho, Portugal***Smart Cities for Sustainable Development**

The world urban population will grow around 63 percent between 2014 and 2050. Megacities, cities with over 20 million inhabitants, will increase from the actual 28 to 41 by 2030. Today, cities are already facing severe challenges in order to become sustainable in the long run but in the future, with the foreseen urbanization rate, the sustainability challenges will be even greater. For becoming sustainable technology-enabled solutions can be used for improving cities mobility, energy consumption, environment, economy, living quality, education, public services, governance and decision-making process. The so-called smart cities urban model shares this vision and promises to be a comprehensive tool to address the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda, in particular to achieve the Goal 11 of making cities and human settlements inclusive, safe, resilient and sustainable. However, the development of Smart Sustainable Cities initiatives is very complex and context-specific, depending on several multi-dimensional factors such as geographical size, economy, political environment, infrastructures, governance, culture, human development, among others. This presentation helps to get a clearer understanding of smart city notion by using a rigorous conceptual framework for implementing smart cities initiatives. In this presentation, will be explained the concept of Smart Cities based on the reviewing of more than 1 thousand policy and research documents and on the surveying of 120 case studies.

Nuno Lopes is a researcher of UNU-EGOV (United Nations University Operating Unit on Policy Driven Electronic Governance). He holds two Postdoctoral positions, one in Internet of Things, Computer Science, at the University of Coimbra and another in Electronic Governance at United Nations University. Currently, he is being working at the Universidade do Minho and at the United Nations University. He began his career as a professor in 1998, since then he has been teaching at several public and private universities. During his working life he has been involved in several National, European and International projects such as Electronic Governance for Context-Specific Public Service Delivery, Knowledge Society Policy Handbook, Policy Monitoring on Digital Technology for Inclusive Education, Intelligent Computing for Internet and Services, Internet of Things for Disable People, Smart Defense and Smart Cities for Sustainable Development. He also gives in a regular basis professional courses, seminars and workshops on ICT, e-learning, computer networks, cybersecurity, smart cities, among others. His current research interests are Smart Cities, e-Governance, Public Service Delivery, Mobile Networks, Cybersecurity, Quality of Service, Real-Time Services, Vehicular Networks, Nano-Communication and Internet of Things.

7. TECHNICAL PROGRAM

Wednesday, July 12

Wednesday, July 12, 10:30 - 12:00

S1: Smart City - Applications (A103)

Chair: Riccardo Colella, University of Salento, Italy

- 1. Comparison of Cogent Confabulation Based Classifier and Naive Bayes Classifier in the Detection of Lens Flares in Wildfire Smoke Detection**
Maja Braović, Darko Stipaničev, Dunja Gotovac and Damir Krstinić (University of Split, Croatia)
- 2. Model for Automatic Geomapping of Aerial Images Mosaic Acquired by UAV**
Dunja Gotovac, Sven Gotovac, Vladan Papić and Stanko Kružić (University of Split, Croatia)
- 3. Opportunities, Risks and Challenges of using Social Media to foster Smart Governance for Smart Cities**
Nuno Vasco Lopes (University of Minho, Portugal); Mariana Lameiras (United Nations University, Portugal)
- 4. A Smart Algorithm to Relief Traffic Congestion**
Nasima Bhuiyan (California State University, Long Beach, USA)
- 5. ArduTalk: A Graphical Programming tool for Arduino using IoTtalk**
Yun-Wei Lin (National Chiao Tung University, Taiwan)

Wednesday, July 12, 13:30 - 15:00

S2: Smart City - Hardware and Systems (A103)

Chair: Nuno Vasco Lopes, University of Minho, Portugal

- 1. Improving trilateration for indoors localization using BLE beacons**
Aitor De Blas and Diego López-de-Ipiña (University of Deusto, Spain)
- 2. Real Time System for Acquiring and Logging the Plan Position Using NI MyRIO Controller**
Raluca Rob, Stela Rusu-Anghel and Caius Panoiu (Politehnica University of Timisoara, Romania)
- 3. A DDS-PLL beam steering polar transmitter for narrowband IoT communications**
Giulio D'Amato, Gianfranco Avitabile and Giuseppe Coviello (Politecnico di Bari, Italy); Claudio Talarico (Gonzaga University, USA)
- 4. Performance Evaluation of NovaGenesis Information-Centric Network**
Antonio M. Alberti, Élcio do Rosário, Giovanni Cassiano, Jorge Carneiro, Victor Hugo Domingues D'Avila and José dos Santos (National Institute of Telecommunications (INATEL), Brazil)
- 5. eMooring: Distributed Low Power Wide Area System to Control Moorings**
Matea Bešlić, Mario Čagalj, Toni Perković, Ivo Stančić and Goran Pavlov (University of Split, Croatia)

S3: Engineering Modeling - Computational Electromagnetics (A104)

Chair: Dragan Poljak, University of Split, Croatia

- 1. A Note on the Use of Domain Discretization Methods in Modeling of some Phenomena in Engineering Physics**
Dragan Poljak and Ante Rubic (University of Split, Croatia); Enora Maze (Blaise Pascal University, France)
- 2. Definition and Computation of Carson Formulas**
Ivan Krol, Tonči Modrić and Slavko Vujević (University of Split, Croatia)

3. Statistical transient impedance of horizontal grounding systems: application to sensitivity analysis with ANOVA approaches

Sebastien Lalléchére, Pierre Bonnet, Françoise Paladian and Khalil El Khamlichi Drissi (Université Clermont Auvergne, France); Silvestar Sesnic, Anna Susnjara and Dragan Poljak (University of Split, Croatia)

Thursday, July 13

Thursday, July 13, 09:00 - 10:30

S5: Energy - Energy Efficiency and Energy Conversion (A103)

Chair: Hyung-Man Kim, INJE University, Korea

- 1. Role of under-rib convection in in situ, reactant and liquid water flows and current density distributions for, polymer electrolyte membrane fuel cells**
Vinh Nguyen Duy, Kanghoon Park and Hyung-Man Kim (INJE University, South Korea)
- 2. Experimental Prediction of Shaded Solar Cells Hot-Spots**
Tonko Garma and Mario Cvetković (University of Split, Croatia); Vedran Bandalo (Auswertungsstelle für Strahlendosimeter Helmholtz Zentrum München, Germany)
- 3. A Light Control Technique for Energy-Efficient Buildings in Visual Comfort Constrained Environment**
Woonsik Lee, Hyejung Cho, Prudhvitej Immadi and Kwanwoo Song (Samsung Electronics, Korea)
- 4. Contribution to Airflow Effect Investigation Over Photovoltaic Surfaces: Temperature and Velocity contours**
Ivo Marinić-Kragić, Sandro Nižetić and Filip Grubišić Čabo (University of Split, Croatia); Agis M. Papadopoulos (Aristotle University of Thessaloniki, Greece)
- 5. An Empirical Survey on the Awareness of Construction Developers about Green Buildings in Macedonia**
Lihnida Stojanovska-Georgievaska, Ivana Sandeva and Hristina Spasevska (University Ss Cyril and Methodius, the former Yugoslav Republic of Macedonia)
- 6. Utilising Passive Indoor Localisation of People, and Energy Device Identification to Enhance the Intelligence of Smart, Home Systems**
Emilio Mistretta, Al-Azhar Lalani and Johann Siau (University of Hertfordshire, United Kingdom)

S6: E-health (Small Hall)

Chair: Katarina Vukojević, University of Split, Croatia

- 1. An unobtrusive expert system to detect freezing of gait during daily living in people with Parkinson's disease**
Lucia Pepa, Lucio Ciabattini, Luca Spalazzi and Maria Gabriella Ceravolo (Università Politecnica delle Marche, Italy)
- 2. Effects of TFD Thresholding On EEG Signal Analysis Based On The Local Rényi Entropy**
Jonatan Lerga, Nicoletta Saulig and Rebeka Lerga (University of Rijeka, Croatia); Zeljka Milanovic (University of Split, Croatia)
- 3. Methodological approach in prediction of balance with machine learning applied on fMRI data**
Ranjith Steve Sivagnanaselvam and Wolfgang Taube (University of Fribourg, Switzerland); Dominique Genoud (University of Applied Sciences Western Switzerland, Switzerland)
- 4. Comparison of Numerical Electric Field and SAR Results in Compound and Extracted Eye Models**
Mario Cvetković, Hrvoje Dodig and Dragan Poljak (University of Split, Croatia)

- 5. Design and implementation of a children safety system based on IoT technologies**
Fabio Franchi, Fabio Graziosi, Claudia Rinaldi, Leonardo D'Errico and Francesco Tarquini (University of l'Aquila, Italy)

Thursday, July 13, 13:30 - 15:00

S4: Energy - Power Electronics and Smart Grid (Great Hall)

Chair: Petar Sarajčev, University of Split, Croatia

- 1. Wind Turbine-Driven Self-Excited Induction Generator: A Novel Dynamic Model Including Stray Load and Iron Losses**
Mateo Bašić, Dinko Vukadinović and Ivan Grgić (University of Split, Croatia)
- 2. Comparative Study of Methodologies for the Estimation of Chargeability of Distribution Transformers**
Diego Paul Chacon-Troya and Luis Geovanny Torres Jaramillo (Salesian Polytechnic University, Ecuador)
- 3. A Non Intrusive Low Cost Arduino-based Three Phase Sensor Kit for Electric Power Measuring**
Andre Aquino, Randy Quindai, Charles Mariano and Heitor S. Ramos (Universidade Federal de Alagoas, Brazil); Joel J. P. C. Rodrigues (National Institute of Telecommunications (Inatel), Brazil and Instituto de Telecomunicações, Portugal)
- 4. Distribution Network Reconfiguration Using Hybrid Heuristic – Genetic Algorithm**
Damir Jakus, Rade Čađenović, Mia Bogdanović and Petar Sarajcevic (University of Split, Croatia); Josip Vasilj (University of Chalmers Gothenburg, Sweden)
- 5. Using Co-Simulation for the Integrated Planning and Analysis of Wide Area Measurement Systems**
Halil Alper Tokel, Gholamreza Alirezaei, Thomas Salzmann and Rudolf Mathar (RWTH Aachen University, Germany)
- 6. A Gamified Platform for Energy Feedback and Usage Forecastings**
Amr Diab, Mina Zeidan, Nada Sharaf, Slim Abdennadher (The German University in Cairo, Egypt)

IoT1: Internet of Things - Software and Health (A102)

Chair: Luigi Patrono, University of Salento, Italy

- 1. SmiWork: An Interactive Smart Mirror Platform for Workplace Health Promotion**
Oihane Gomez-Carmona and Diego Casado-Mansilla (University of Deusto, Spain)
- 2. A Context Aware System for an IoT-Based Smart Museum**
Aparokshith Rao, Aditya Vikram Sharma and Shiva Narayan (College Of Engineering Guindy, India)
- 3. An AAL system based on IoT Technologies and Linked Open Data for elderly monitoring in Smart Cities**
Aitor Almeida, Ruben Mulero and Gorka Azkune (DeustoTech, Spain); Luca Mainetti, Vincenzo Mighali, Luigi Patrono, Piercosimo Rametta and Ilaria Sergi (University of Salento, Italy)
- 4. Rapid Prototyping Internet of Things Solutions Through a Model-Driven Approach: A Case Study in AAL**
Adriana Caione, Alessandro Fiore, Luca Mainetti and Roberto Vergallo (University of Salento, Italy); Luigi Manco (University of Salento and Vidyasoft Srl, Italy)
- 5. Facilitation of IoT software maintenance via code analysis and generation**
Aleksandar Dimov and Dimitar Manev (Sofia University, Bulgaria)

Thursday, July 13, 15:30 - 17:00

IoT2: Internet of Things - Hardware (A102)

Chair: Luca Catarinucci, University of Salento, Italy

1. Passive UHF RFID System Evaluation in a Retail Environment

Hadi Farhat and Plamen Iliev (Embisphere, France); Philippe Mariage and Nathalie Rolland (Institut d'Electronique, de Microélectronique et de Nanotechnologie, France)

2. Design of UHF RFID Devices Based on 3D-Printing Technology

Luca Catarinucci and Riccardo Colella (University of Salento, Italy)

3. Signal-to-Noise Ratio Measurements and Statistical Characterization in Gen2 RFID

Zoran Blažević, Petar Šolić, Maja Škiljo and Maja Stella (University of Split, Croatia); Čedomir Stefanović, Petar Popovski and Gert Pedersen (Aalborg University, Denmark)

4. 90/900 MHz IC Architecture for Autonomous Systems

Alfiero Leoni, Vincenzo Stornelli, Giuseppe Ferri and Leonardo Pantoli (University of L'Aquila, Italy); Petar Šolić and Mladen Russo (University of Split, Croatia)

5. Segment-aware Energy-efficient Management of Heterogeneous Memory System for Ultra-Low-Power IoT Devices

Hayeon Choi, Youngkyoung Koo and Sangsoo Park (Ewha Womans University, Korea)

6. ZnO tetrapods-based humidity sensors

Ahmed Afify and Jean Marc Tulliani (Politecnico di Torino, Italy); Amir Abidov (Tashkent State Technical University, Uzbekistan); Sungin Kim (Kumoh National Institute of Technology, Korea)

Friday, July 14

Friday, July 14, 09:30 - 11:00

S7: Engineering Modeling - Applied Engineering Electromagnetics (A104)

Chair: Dragan Poljak, University of Split, Croatia

1. Some Notes on the Impulse Characteristics of Type A Grounding of Transmission Line Tower

Zijad Bajramović, Salih Čarsimamović, Adnan Mujezinović, Irfan Turković and Samir Avdaković (University of Sarajevo, Bosnia and Herzegovina); Meludin Veledar (International Council on Large Electric Systems, Bosnia and Herzegovina Committee, Bosnia and Herzegovina)

2. Comparison of Different Analytical Models to Determine Electric Field Radiated by a Base Station Antenna

Marin Galić (Environmental Measurement Center LTD, Croatia); Dragan Poljak and Vicko Dorić (University of Split, Croatia)

3. Spectral Analysis of the Weierstrass-Mandelbrot Function

Emanuel Guariglia (University of Salerno, Italy)

4. Electrostatic Discharge Current Modelling Using Multi-Peaked Analytically Extended Function

Karl Lundengård, Milica Rančić and Sergei Silvestrov (Mälardalen University, Sweden); Vesna Javor (University of Niš, Serbia)

- 1. Emerging Infrastructure and Technology Challenges in 5G Wireless Networks**
Murat Aydemir (Gebze Technical University, Turkey); Korhan Cengiz (Trakya University, Turkey)
- 2. LoRaWAN – A Low Power WAN Protocol for Internet of Things: a Review and Opportunities**
Jonathan de Carvalho Silva and Antonio M Alberti (National Institute of Telecommunications (Inatel), Brazil); Joel J. P. C. Rodrigues (National Institute of Telecommunications (Inatel), University of Fortaleza (UNIFOR), Brazil and Universidade da Beira Interior, Portugal); Petar Šolić (University of Split, Croatia); Andre Aquino (Computer Institute, Federal University of Alagoas, Brazil)
- 3. ERAOF: A New RPL Protocol Objective Function for Internet of Things Applications**
Natanael Sousa and Ricardo Rabelo (Federal University of Piauí (UFPI), Brazil); José Victor Vasconcelos Sobral (Instituto de Telecomunicações, University of Beira Interior and Federal Institute of Maranhão, Portugal); Joel J. P. C. Rodrigues (National Institute of Telecommunications (Inatel), University of Fortaleza (UNIFOR), Brazil and Universidade da Beira Interior, Portugal); Petar Šolić (University of Split, Croatia)
- 4. Application-Aware Optimization Approaches for Multiple-Criteria Network Selection in Mobile Heterogeneous Networks**
Yevgeniy Yeryomin and Jochen Seitz (Technische Universität Ilmenau, Germany)
- 5. An IoT-aware Remote Monitoring System for Emergencies in Rallying**
Luigi Patrono, Piercosimo Rametta and Maria Laura Stefanizzi (University of Salento, Italy)

8. PROFESSIONAL PROGRAM

Wednesday, July 12

Wednesday, July 12, 10:30 - 12:00

P1: Energy 1 (A104)

Chair: Sandro Nižetić, University of Split, Croatia

- 1. Investigation of Efficiency Improvement of an Induction Air Heater: a Thermal Analysis**
Umit Unver, Ahmet Yuksel, Alper Kelesoglu and Fikret Yuksel (Yalova University, Turkey); Halil Unver (Kirikkale University, Turkey)
- 2. Thermal comfort for typical educational research institution: A case study**
Nikolina Pivac and Sandro Nižetić (University of Split, Croatia); Vlasta Zanki (HEP ESCO d.o.o., Croatia)
- 3. Comparison of the reactive control strategies in LV network with PV generation and storage**
Dario Garozzo and Giuseppe Marco Tina (University of Catania, Italy)
- 4. New technologies in precise agriculture and possibilities of application in Serbia**
Miladin M. Ševarić, Sofija Mladenović, Rade Nastić and Luka Živković (University of Belgrade, Serbia); Marko Živković (Delta Agrar, Serbia)

P2: Software and Applications (A105)

Chair: Matko Šarić, University of Split, Croatia

- 1. Kinect as Master of Puppets: Animating Avatars for Virtual and Augmented Reality**
Mateo Čobanov, Barbara Džaja and Josip Musić (University of Split, Croatia)
- 2. Development of Modular Unmanned Surface Vehicle for Research and Education**
Josip Vasilj, Ivo Stančić, Josip Musić and Tamara Grujić (University of Split, Croatia)
- 3. Wearable RFID devices and cloud platform for efficient waste management**
Cosimo Salvatore, Alfredo Salvatore and Angelo Primiani (Sensor ID, Italy)
- 4. Human detection in aerial images gathered with Unmanned Aerial Vehicles (UAV) using Convolutional Neural Networks**
Mirela Kundid Vasić (University of Mostar, Bosnia and Herzegovina); Vladan Papić (University of Split, Croatia)
- 5. A Video Compression Method for Low Power Consumption Applications in Sensors Networks**
Ben-Shung Chow (National Sun Yat-Sen University, Taiwan)

Wednesday, July 12, 13:30 - 15:00

P3: Theory and Applications (A105)

Chair: Zoran Blažević, University of Split, Croatia

- 1. Security and Privacy Aspects of Modern ICT Concepts**
Sandro Geric and Renata Mekovec (University of Zagreb, Croatia)
- 2. Widely Linear MIMO Precoding for Secure D2D Communications in Cellular Networks**
Bangwon Seo (Kongju National University, Korea)

3. Quadcopter altitude control in low level hovering using PID controller

Ante Maras, Josip Musić and Ivo Stančić (University of Split, Croatia)

4. Wi-Fi Channel Measurements in the Outdoor Building Environment

Željko Sanader, Maja Škiljo and Zoran Blažević (University of Split, Croatia)

Friday, July 14

Friday, July 14, 11:30 - 13:00

P4: Energy 2 (A104)

Chair: Giuseppe Marco Tina, University of Catania, Italy

1. Utilization of Degree Day Method to Determine the Theoretical Maximum Production Potential of a Gas Turbine

Umit Unver and Alper Kelesoglu (Yalova University, Turkey); Muhsin Kılıç (Uludağ University, Turkey)

2. Assessment of Environmental Aspects on Comfort Perception in Buildings in Mediterranean Region

Panagiota Antoniadou, Effrosyni Giama and Agis M. Papadopoulos (Aristotle University of Thessaloniki, Greece)

3. Integrating and processing building energy data to support decision making

Leandro Madrazo, Álvaro Sicilia, Marco Massetti, Fabian López Plasas and Eric Ortet (ARC Engineering and Architecture La Salle and Ramon Llull University, Spain)

4. Geographic Floating Photovoltaic Potential

Giuseppe Marco Tina (University of Catania, Italy); Raniero Cazzaniga, Marco Rosa-Clot and Paolo Rosa-Clot (Koinè, Italy)

**Dragan Poljak, Mario Cvetković, Valerio De Santis****Paper presentation:****1. Interaction of Humans with Electromagnetics Fields**

Dragan Poljak and Mario Cvetković (University of Split, Croatia); Valerio De Santis, University of L'Aquila, Italy

Human Exposure to Non-Ionizing Radiation

by Dragan Poljak, University of Split, Croatia

The scope of this part of the Tutorial is to review various aspects of human exposure to undesired electromagnetic fields from artificial sources thus covering; basic ideas of electrosmog, coupling mechanisms between humans and electromagnetic fields, biological effects of electromagnetic fields, electromagnetic-thermal dosimetry methods, international/national safety guidelines, relevant exposure limits and safety measures. First, some theoretical and experimental techniques of incident field dosimetry for the determination of external fields due to power lines, transformer substations, radio base station antennas and mobile phones are studied. Furthermore, the presentation aims to review some electromagnetic-thermal dosimetry methods for the assessment of human exposure to low frequency (LF) and high frequency (HF) non-ionizing electromagnetic fields. In particular, the analysis approaches are based on certain integral/differential equation formulations and related numerical solution procedures (based on the use of Boundary Element Method – BEM, and Finite Element method – FEM) for the calculation of induced current densities and fields, specific absorption rate (SAR) and related temperature increase in a tissue. Illustrative computational examples pertaining to some realistic exposure scenarios, such as; pregnant woman/foetus exposed to low frequency (LF) fields, the human eye, the human brain and the human head exposed to HF electromagnetic fields will be given. Also, some numerical results for the nerve fiber stimulation will be presented as an example of biomedical application of electromagnetic fields. The obtained numerical results for induced current densities, internal fields and SAR are compared against exposure limits proposed by ICNIRP (International Commission on Non Ionizing Radiation Protection). Finally, the last part of the Tutorial deals with deterministic stochastic-modeling to account for the influence of the variability in the morphology and the tissue properties of the organs, such as the brain and eye, respectively, exposed to LF and HF fields. It will be shown how deterministic-stochastic modeling provides the estimation of the effects of the parameter uncertainties on the maximum induced current density, electric field and Specific Absorption Rate (SAR).

Stochastic Dosimetry of Human Brain: Application to Transcranial Magnetic Stimulation and High Frequency Electromagnetic Exposure

by Mario Cvetković, University of Split, Croatia

In addition to unwanted exposure to man-made electromagnetic (EM) fields due to steadily increasing number of power and communication installations, efficient medical treatments using electromagnetic radiation also require the knowledge of the accurate distribution of the EM fields inside the tissues. As measurement of these quantities is rather difficult, the use of computational methods has become necessary to determine internal field distributions. However, the computational dosimetry, dealing with quantification of effects caused by the field interactions with biological body faces one of the great challenges related to the uncertainty of the various input parameters. Hence, the so called stochastic dosimetry approach is required, combining the use of the deterministic techniques with the statistical methods. This approach is demonstrated first on the case of the Transcranial Magnetic Stimulation (TMS), a noninvasive and painless technique for achieving excitation or inhibition of cortical brain regions. Although the variable efficiency of TMS stimulation can be primarily attributed to differences in relevant TMS settings such as coil positioning, pulse waveform, frequency, number of stimuli and the intensity of stimulation, the obvious difference in brain size between the individuals, as well as the biological tissue parameters such as permittivity and the electrical conductivity needs to be taken into account, since they will affect the distribution of the induced fields in the brain. The deterministic electromagnetic model combined with the use of a stochastic collocation technique can help in examining the influence of the brain tissue parameters' uncertainty and the coil positioning variations on the induced electric field and the related electric current density in the human brain model, thus aiding in determination of the exact location of stimulation, in the interpretation of experimental results or in the design of a more efficient stimulation setups. The stochastic collocation technique can also be combined with the electromagnetic-thermal model used within the dosimetric assessment of human brain exposed to high frequency EM field. Stochastic dosimetry can thus be used to examine the effects of the variability in the brain morphology and the tissue properties as well as in the sensitivity analysis of thermal parameter investigating their influence on the temperature rise as a direct consequence of the brain exposure to EM field.

Human Body Models for Numerical Dosimetry and Biomedical Applications

by Valerio De Santis, University of L'Aquila, Italy

Numerical simulations are increasingly used to investigate both the impact of external electromagnetic fields on the human body and for medical applications, thereby complementing experimental studies. In the long term, the significance of numerical evaluations performed with computational human models can be expected to outweigh experimental studies. In this tutorial, an overview of human body models specifically developed for numerical dosimetry and biomedical applications will be envisaged. After a brief historical overview, the comparison between voxel-based models coming from MRI or CT image scans versus more complex CAD models will be presented. Automated vs. semi-automated segmentation procedures to develop these models will also be addressed. Finally, basic concepts on how to assign the right material properties to the several biological tissues will be undertaken.

Biography: *Dragan Poljak was born on 10 October 1965. He received his BSc in 1990, his MSc in 1994 and PhD in electrical engineering in 1996 from the University of Split, Croatia. He is the Full Professor at Department of Electronics, Faculty of electrical engineering, mechanical engineering and naval architecture at the University of Split, and he is also Adjunct Professor at Wessex Institute of Technology. His research interests include frequency and time domain computational methods in electromagnetics, particularly in the numerical modelling of wire antenna structures, and numerical modelling applied to environmental aspects of electromagnetic fields. To date Professor Poljak has published nearly 200 journal and conference papers in the area of computational electromagnetics, seven authored books and one edited book, by WIT Press, Southampton-Boston, and one book by Wiley, New Jersey. Professor Poljak is a member of IEEE, a member of the Editorial Board of the journal Engineering Analysis with*

Boundary Elements, and co-chairman of many WIT International Conferences. He is also editor of the WIT Press Series Advances in Electrical Engineering and Electromagnetics. He was awarded by several prizes for his career achievements, such as National Prize for Science (2004), Croatia section of IEEE annual Award (2016). In 2011 professor Poljak became a member of WIT Bord of Directors. From 2011 to 2015 he was the Vice-dean for research at the Faculty of electrical engineering, mechanical engineering and naval architecture. In June 2013 professor Poljak became a member of the board of the Croatian Science Foundation. He is currently involved in 3 COST projects, ITER physics EUROfusion collaboration and one national center for excellence in research for technical sciences. He is a co-chair of Working Group 2 of IEEE/International Committee on Electromagnetic Safety (ICES) Technical Committee 95 SC6 EMF Dosimetry Modeling.

Biography: Mario Cvetkovic received the B.S. degree in electrical engineering from the University of Split, Croatia in 2005. In 2009 he obtained M.Phil degree from the Wessex Institute of Technology, University of Wales, UK. In December 2013 he received Ph.D. from University of Split, Croatia, for the thesis entitled "Method for Electromagnetic Thermal Dosimetry of the Human Brain Exposed to High Frequency Fields". In December 2010, he held a seminar to graduate and postgraduate students at the Technical University of Ilmenau, Germany, and in September 2014 he held a seminar at the Mälardalen University, Västerås, Sweden. He is a recipient of the "Best Student Paper Award", awarded at the 16th edition of the international conference SoftCOM 2008. At the Scientific Novices Seminar held in 2012, he was awarded with the recognition for his previous scientific achievements. To date he has published 38 journal and conference papers and two book chapters (CRC Press and Springer). He is currently working as a postdoc at the Faculty of electrical engineering, mechanical engineering and naval architecture (FESB), University of Split. His research interests are numerical modeling including finite element and moment methods, computational bioelectromagnetics and heat transfer related phenomena. He is a member and is also serving as a secretary of Working Group 2 of IEEE/International Committee on Electromagnetic Safety (ICES) Technical Committee 95 SC6 EMF Dosimetry Modeling.

Biography: Valerio De Santis was born in L'Aquila, Italy, on August 23, 1982. He received the Bs.C, Ms.C, and Ph.D. degrees in electrical and computer engineering from University of L'Aquila, Italy, in 2004, 2006, and 2010, respectively. He was an external collaborator with the Department of Surgical Science of L'Aquila and the Italian Environment Ministry from February to November 2005 concerning an epidemiologic study related to the exposure of electromagnetic fields and melanoma of the uvea. He was a visiting researcher at the Motorola Corporate EME Research Laboratories, Plantation, FL, from June to September 2007, at the Philips Applied Technologies, Eindhoven, The Netherlands, from May to July 2008, and at the University of Calgary, Alberta, Canada, from May to July 2010.

In April 2011, he joined the IT'IS Foundation where he was working on various dosimetry projects and computational electromagnetics. He was with the Department of Electrical and Computer Engineering, Nagoya Institute of TEchnology, Japan, as an Assistant Professor. He is now a Fellow Researcher at the Department of Industrial and Information Engineering and Economics, University of L'Aquila, Italy

10. ROUND TABLE DISCUSSION

ROUND TABLE

Friday, July 14
12:15 -13:00 (Great Hall)



Toni Perković
University of Split, Croatia

Smart City: Concepts, Realization and Experiences

Every city presents a unique system in which various actors from the city government to public utility companies and citizens are taking numbers of activities, thus creating a complex of interactions and interdependencies. Taking into account the priority activities of the city, as well as the environmental and social context including history and their specific characteristics, there is a need to establish a methodology that would help us finding a path towards smart and sustainable city.

The creation of smart and sustainable city does not present a purely technological process that usually promotes industrial sector throughout the implementation of i.e., smart lighting, in fact it is a complex process of business transformation and adaptation of large number of stakeholders involved in the development of urban and regional strategies. Thus, the model would include not only the city government and county, but also the presence of local universities, research centers, trade associations, public agencies, civil associations and local economy. Understanding the city as an open ecosystem, in which the promotion of mutual cooperation, accelerators, technology incubators and urban laboratories would enable the improvement of collective intelligence that would strengthen the creative energy of the city.

Therefore, within the context of SmartCity roundtable to be held during SpliTech conference, we invite stakeholders of the city, the county, the local economy and regulatory bodies to give their opinion on the development and sustainability of smart sustainable city. Throughout the discussion of current situation of the ICT maturity the stakeholders should define all what is necessary to achieve the vision of smart and sustainable city. Stakeholders should also provide answers to specific questions: What is the future smart city? What are the general objectives of the initiative and what is the main idea to achieve the specific objectives?

Biography: *Toni Perković is currently employed as Assistant professor at University Department for Forensic Sciences, University of Split, Croatia. He received the Dipl. Ing. degree in telecommunications and electrical engineering from the University of Split, Croatia, in 2007, and the PhD degree in Computer Science from the University of Split, Croatia, in 2013. His research interests include the location privacy, security and privacy in Internet of Things, the usability, design and analysis of security protocols for wireless (sensor) networks, the usability and design of the secure authentication protocols.*

11. SYMPOSIUM ON RFID & EMBEDDED SYSTEMS FOR INTERNET OF THINGS

- experience, challenges and evolution -

The main goal of this symposium is to present and discuss recent advances in the area of the Internet of Things, where Radio Frequencies (RF) technologies and embedded systems are becoming research topics more and more interesting for both academia and industry. This symposium will provide an opportunity for scientists, engineers and researchers to discuss new applications, design problems, ideas, solutions, research and development results, experiences and work-in-progress activities in this important technological area. In particular, several ICT companies will be invited in order to report a real vision of the industry on challenges and solutions in the IoT sector. Meeting corners and exhibition session will be organized in cooperation with some companies such as STMicroelectronics, Amplifico, CAENRFID, MANAS, SensorID, InClude, SofThings, SELMET, Ericsson, Siemens Convergence Creators

SYMPOSIUM CO-CHAIRS

Luigi Patrono and Lucca Catarinucci, University of Salento, Italy



STMicroelectronics

Andrea Palmieri: "Prototyping IoT Nodes with STM32"



Amplifico

Dario Boras: "Parklio - smart parking barrier"



MANAS

Nino Mijač and Ante Veža: "Drones and Internet of Things"



SensorID

Alfredo Salvatore and Angelo Primiani: "Wearable RFID devices for IoT applications"



Convergence Creators

Siemens Convergence Creators

Denis Jakus: "Industry 4.0 - Security aspects in development of enterprise applications for (I)IoT"



InClude

Josip Balić and Duje Roje: "Smart bench"



SofThings

Piercosimo Rametta and Luigi Patrono: "IoT Technologies for new user-centric services: Softhings vision"



Ericsson

Zoran Civadelić and Ivan Janković : "Ericsson IoT platform"



Selmet

Veljko Bituh and Davorin Šajnović: "RFID solutions and use cases: Selmet vision"

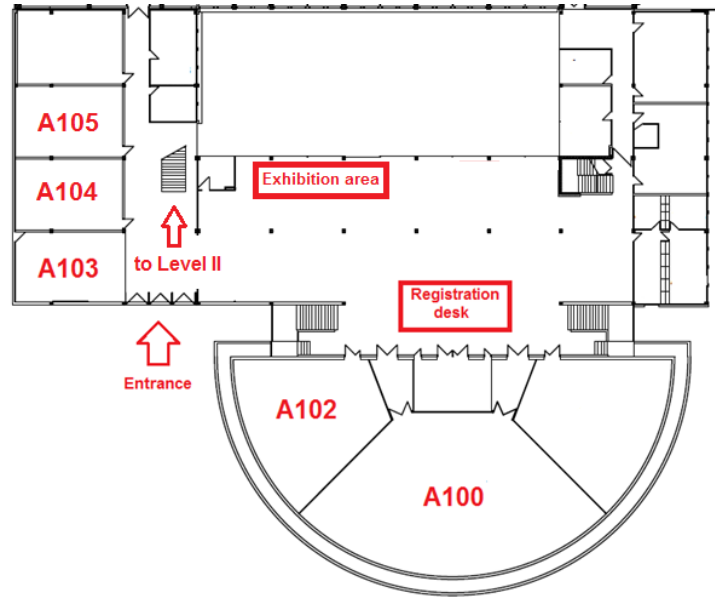


CAEN RFID

Stefano Coluccini: "Temperature monitoring with RFID"

12. MAPS

Level I



Level II

