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GENERAL CO-CHAIRS MESSAGE

Welcome Message

Dear participants and colleagues, it is our pleasure to welcome you to SoftCOM 2021 conference. We are excited to have an opportunity to take part in the organization of an international conference that gathers researchers and professionals from academia and industry to share experiences and new ideas in such a dynamic area as Information and Communication Technology.

Current and emerging information and communication technologies are key drivers of the information society and economy. With both evolving and new services we are enabling people to collaborate, innovate, learn, participate in ways we never thought possible. Online learning and working from home are increasingly becoming our daily routine and reality. Through joint research and technology advancement we are opening ground for new discoveries and sustainable global economic growth. We can shape the 21st century economy in ways that are clean, green, healthy, safe and more resilient, and we have an opportunity for a systemic shift to a more sustainable economy that works for both people and the planet.

The 29th International Conference on Software, Telecommunications and Computer Networks (SoftCOM 2021), technically co-sponsored by the IEEE Communications Society, will be held on the beautiful island of Hvar located on the magnificent Croatian Adriatic coast. It will be our pleasure to meet you at the conference.

Welcome!

*Sinisa Krajnovic, Ericsson AB
Dinko Begusic, University of Split*

TEHNICAL PROGRAM CHAIRS MESSAGE

The 29th Conference on Software, Telecommunications and Computer Networks (SoftCOM 2021) will be held in a hybrid format, including live and virtual participation, in Grand Hotel Amfora, Hvar, Croatia, September 23 to 25, 2021.

Researchers and experts from industry, research institutes and universities from 28 countries all around the world have submitted their submissions for presentation at SoftCOM 2021. Submitted papers have been reviewed by scientists from universities, institutes and ICT companies. The accepted papers have been carefully selected based on their contribution, relevance, conceptual clearness and overall quality.

The technical conference program features seven general conference sessions and eight special sessions. In addition a symposium dedicated to Robotic and ICT Assisted Wellbeing has been organized.

The special sessions are dedicated to hot topics including: QoS in Wired and Wireless Networks, Ad Hoc and Sensor Networks, Green Networking and Computing, Security and Digital Forensics, Smart Environments and IoT, Advances in Data Analytics, Environmental Electromagnetic Compatibility, and Advanced Educational Technologies.

Besides that a Business Forum will be organized featuring invited talks, industrial panel, and workshops with participation of managers, experts, professionals and institutions' representatives. The 10th Workshop on Software Engineering in Practice has been organized by the research group from Ericsson Nikola Tesla company. The 20th Ericsson Nikola Tesla Summer Camp workshop provide the opportunity to students to promote their achievements and improve their innovations management skills.

On behalf of the Technical Program Committee we would like to thank and credit the authors for their excellent contributions. Particular thanks to the reviewers for their great job as well as to the IEEE Communications Society (ComSoc), Technical Committee of Communication Software for the support.

*Technical Program Committee Co-chairs
Nikola Rozic, Pascal Lorenz*

SoftCOM 2021 COMMITTEES

TECHNICAL PROGRAM COMMITTEE

Nikola Rozic, University of Split, Croatia (co - chair)

Pascal Lorenz, University of Haute Alsace, France (co-chair)

Abd-Elhamid Taha, Alfaisal University

Aleksejs Udalcovs, RISE Research Institutes of Sweden AB, Sweden

Alex Gelman, NETovations, LLC, USA

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Ignac Lovrek, University of Zagreb, Croatia

Jaime Lloret Mauri, Polytechnic University of Valencia, Spain

Joel Rodrigues, National Institute of Telecommunications (Inatel), Brazil

Josip Lorincz, University of Split, Croatia

Josko Radic, University of Split, Croatia

Luigi Patrono, University of Salento, Italy

Maja Matijasevic, University of Zagreb, Croatia

Maja Stella, University of Split, Croatia

Matko Saric, University of Split, Croatia

Miljenko Mikuc, University of Zagreb, Croatia

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Tianhua Xu, University of Warwick, UK

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Tony Bogovic, Perspecta Labs, USA

Vesna Roje, University of Split, Croatia

Zoran Blazevic, University of Split, Croatia

SoftCOM 2021 Conference Secretary

Katarina Radoš, University of Split, softcom@fesb.hr

**UNIVERSITY OF SPLIT
FACULTY OF ELECTRICAL ENGINEERING,
MECHANICAL ENGINEERING AND NAVAL
ARCHITECTURE - FESB SPLIT**

**COMMUNICATIONS AND INFORMATION
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CROATIA CHAPTER**

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SoftCOM 2021 PROGRAM OUTLINE

Thursday, September 23, 2021 (hybrid)

08:00 – 10:30 Registration

10.30 - 11.00 Coffee break

11.00 - 12.30 Technical program, Professional program, Business forum

12:30 – 14:00 Lunch

14.00 - 14.30 Invited Talk

14.30 - 16.00 Technical program, Professional program, Business forum

16.00 - 16.30 Coffee break

17:00 – 18:30 Walking Tour in Hvar

Friday, September 24, 2021 (hybrid)

08:00 – 09:00 Registration

09.00 - 10.30 Technical program, Professional program, Business forum

10.30 - 11.00 Coffee break

11.00 - 12:00 Keynote speech

12:00 – 14:00 Conference Luncheon

14.00 - 15.30 Technical program, Professional program, Business forum

15.30 - 16.00 Coffee break

16.00 - 17.30 Technical program, Professional program, Business forum

17:30 – 19:00 Walking Tour in Hvar

20:00 Conference Dinner

Saturday, September 25, 2021 (hybrid)

09.00 – 10.30 Technical program, Professional program, Business forum

10.30 - 11.00 Coffee break

11.00 - 12.00 Conference Closing Gathering

KEYNOTE / INVITED SPEAKERS

KEYNOTE SPEECH

Friday, September 24

11:00-12:00 (BURA)

Elena Fersman, PhD

Head of Global AI Accelerator, Ericsson

AI for Telecom and Beyond

Industries such as automotive, transportation and manufacturing present typical examples of cyber-physical systems, where the physical world is linked with the virtual world aiming at creating a desired global behavior in a collaborative manner. Such systems are becoming increasingly connected, providing new cross-domain business opportunities. Ubiquitous connectivity and heterogeneity of systems pose new challenges on the underlying telecom network that needs to be capable of responding to a variety of requirements. This creates complexity that goes beyond the capabilities of human management, and hereby, a need for intelligent automation. In this talk we will discuss how the networks benefit from AI with respect to automation, and what new values can be created for the industries.



Elena Fersman is a Vice President and Head of Global AI Accelerator at Ericsson. She is responsible for a distributed team based in USA, Sweden, India and Canada. Elena is a docent and an adjunct professor in Cyber-Physical Systems specialized in Automation at the Royal Institute of Technology in Stockholm. She holds a PhD in Computer Science from Uppsala University, an MBA from St. Petersburg Polytechnic University and did a postdoc at the University Paris-Saclay. At Ericsson, she had various positions ranging from product management to research leadership. Elena is a member of the Board of Directors of RISE Research Institutes of Sweden. Elena has co-authored over 50 patent families.

INVITED SPEAKER IS1

Thursday, September 23

14:00-14:30 (BURA)

Marcelo Sampaio de Alencar, PhD

President of the Institute for Advanced Studies in Communications (Iecom)

The New Economic Attitude in the Information Era

This presentation introduces some economic concepts in a non-orthodox way, relating them to physical phenomena, to explain some peculiarities of the Internet economic environment. The talk discusses how the Internet economy violates classic principles, well established by Adam Smith, Karl Marx, and other important economists. The evolution of the World Wide Web is discussed, along with some interesting anecdotes that contradict the usual history of the Internet. The origins of Amazon, Google, Facebook, and other engines are discussed, and it is shown that most of them derived from simple features of the UNIX system.



Marcelo Sampaio de Alencar received his Bachelor Degree in Electrical Engineering, from Universidade Federal de Pernambuco (UFPE), Brazil, 1980, his Master Degree in Electrical Engineering, from Universidade Federal da Paraíba (UFPB), Brazil, 1988 and his Ph.D. from the University of Waterloo, Canada, 1994. He worked for the Department of Electrical Engineering, Federal University of Paraíba (UFPB), for the Federal University of Campina Grande (UFCG), for the State University of Santa Catarina (UDESC), and for the Federal University of Bahia (UFBA). He was visiting professor at the University of Toronto, and is now visiting professor at the Senai Cimatec, Salvador, Brasil. He is founder and President of the Institute for Advanced Studies in Communications (Iecom). He has been awarded several scholarships and grants, from the Brazilian National Council for Scientific and Technological Research (CNPq), from the IEEE Foundation, from the University of Waterloo, and from the Federal University of Paraíba. He received an achievement award from the Brazilian Telecommunications Society (SBrT), an award from the Medicine College of the Federal University of Campina Grande (UFCG), and an achievement award from the College of Engineering of the Federal University of Pernambuco. He published over 500 engineering and scientific papers and 26 books. He also wrote chapters for 12 books. He served on the Board of Directors of SBrT and on the SBMO Council. He is a Registered Professional Engineer, and he was a columnist for the traditional Brazilian newspaper Jornal do Commercio. Marcelo S. Alencar is a laureate of the prestigious 2014 Attilio Giarola Medal, of the Brazilian Microwave and Optoelectronics Society (SBMO).

TECHNICAL PROGRAM: GENERAL CONFERENCE

Thursday, September 23, 11:00 - 12:30 (LEVANT)

S1: MACHINE LEARNING APPLICATIONS

Chair: Matko Šarić, University of Split, Croatia

A Legendre Polynomial Neural Network and its Application in Predicting Data Center Temperature

Nikolaos Melissaris and George Tsekouras (University of the Aegean, Greece); Stamatis Chatzistamatis (International Hellenic University, Greece); John Tsimikas (University of the Aegean, Greece)

Using Feedforward Neural Networks for Parameter Modeling of a 4G Link for Unmanned Aerial Vehicles

Giancarlo Benincasa and Erich Leitgeb (Graz University of Technology, Austria); Klaus Kainrath (FH-Joanneum, Austria); Hristo Ivanov (Graz University of Technology, Austria)

Players detection using U-Net based fully convolutional network

Ivan Biliskov (Codeasy & University of Split, Croatia); Matko Saric, Mladen Russo and Maja Stella (University of Split, Croatia)

Evaluation of VANET Datasets in context of an Intrusion Detection System

Fabio Goncalves and Joaquim H Macedo (University of Minho, Portugal); Alexandre Santos (University of Minho & Centro Algoritmi, Portugal)

Thursday, September 23, 11:00 - 12:30 (MAESTRAL)

S2/I: SIGNAL PROCESSING AND CODING I

Chair: Joško Radić (University of Split, Croatia)

An Online Platform for Testing and Evaluating Random Number Generators

Paweł Kubczak, Wiktor Woźniak, Jakub Nikonowicz, Łukasz Matuszewski and Mieczysław Jessa (Poznan University of Technology, Poland)

A new accurate approximation of the Gaussian Q-Function with relative error less than 1 thousandth in a significant domain

Alessandro Soranzo, Francesca Vatta, Massimiliano Comisso, Giulia Buttazoni and Fulvio Babich (University of Trieste, Italy)

Software Implementation and Computational Complexity Analysis of Hamming Codes Polynomial Co-Decoding

Flavio Ellero, Gabriele Palese, Erika Tomat and Francesca Vatta (University of Trieste, Italy)

Modified autoencoder structure for reducing BER performance

Khaled Ramdani (CEDRIC/LAETITIA Laboratory, CNAM, France); Hmaied Shaiek (CNAM, France); Daniel Roviras (Cnam, France)

Thursday, September 23, 14:30 - 16:00 (MAESTRAL)

S2/II: SIGNAL PROCESSING AND CODING II

Chair: Joško Radić (University of Split, Croatia)

Seismic data recovery from a reduced set of measurements

Andjela Draganić (University of Montenegro, Faculty of Electrical Engineering, Montenegro); Irena Orović (Faculty of Electrical Engineering, University of Montenegro, Montenegro); Marko Beko (ULHT/UNINOVA & UNINOVA, Caparica, Portugal); Srdjan Stanković (Faculty of Electrical Engineering, University of Montenegro, Montenegro)

A new perspective for rearrangeability of MINs

Fitz Gerald Cabangcla (Sapienza University of Rome, Italy); Daniele Izzi (University "La Sapienza", Italy); Annalisa Massini (Sapienza Università di Roma, Italy)

The GR2 Algorithm for Subgraph Isomorphism. A Study from Parallelism to Quantum Computing

Gheorghica Radu-Iulian (Babeş-Bolyai University & Faculty of Mathematics and Computer Science, Romania)

The GR3 Algorithm for Parallel Quantum Searching of Subgraph Isomorphism

Gheorghica Radu-Iulian (Babeş-Bolyai University & Faculty of Mathematics and Computer Science, Romania)

Saturday, September 25, 09:00 - 10:30 (LEVANT)

S3: 5G&B5G TECHNOLOGIES

Chair: Maja Matijašević (University of Zagreb, Croatia)

Edge Computing for Communication Service Providers: A review on the Architecture, Ownership and Governing models

Charles J Ferrari (Eötvös Loránd University, Hungary); Benedek Kovacs (BUTE, Hungary); Melinda Tóth and Zoltán Horváth (Eötvös Loránd University, Hungary); Anna Reale (ELTE Eötvös Loránd University, Hungary)

Transmitter Receiver Antenna Selection for MIMO-NOMA System

Bircan Demiral (Başkent University, Turkey); Ozgur Ertug (Gazi University, Turkey)

Massive MIMO-OFDM Performance Enhancement on 5G

Zainab Shawqi, Iraq and Subhi Rafeeq (Duhok Polytechnic University, Iraq); Siddeeq Yousif Ameen (Advisor & Duhok Polytechnic University, Iraq)

Metamaterial Decoupling MIMO Antennas for 5G Communication

Linda Chouikhi and Chaker Essid (SERCOM Laboratory, Polytechnic School, University of Carthage, Tunisia); Hedi Sakli (EITA Consulting, France); M. Bassem Ben Salah (SERcom, Tunisia Polytechnic School, Carthage University, Tunisia)

Thursday, September 23, 14:30 - 16:00 (LEVANT)

S4: WIRELESS COMMUNICATIONS

Chair: Marcelo S. Alencar (Federal University of Campina Grande & Institute for Advanced Studies in Communications, Brazil)

Effect of Epidemic Interference on the Performance of Digital Communication Systems

Marcelo S. Alencar (Federal University of Campina Grande & Institute for Advanced Studies in Communications, Brazil); Joel E. Cordeiro, Jr (Federal University of Bahia (UFBA), Brazil); Marina Yashina (State Technical University, Russia); Alexander Tatashev (Moscow Automobile and Road Construction State Technical University (MADI), Russia)

Performance Evaluation of Heterogeneous Cellular Networks Using Stochastic Petri Nets

Zhiyi Zhu and Toshikazu Nishimura (Ritsumeikan University, Japan); Eiji Takimoto (Hiroshima Institute of Technology, Japan); Junjun Zheng (Ritsumeikan University, Japan)

Impact of the Neighbor's Order on the Capacity of Millimeter-Wave Links with Poisson-Distributed Nodes in Line of Sight Conditions

Massimiliano Comisso, Francesca Vatta, Giulia Buttazzoni and Fulvio Babich (University of Trieste, Italy)

Determination of LCR for Multi-branch SC Receiver under the Effects of α - k - μ Fading and Weibull Co-Channel Interference

Suad Suljovic and Dragana Krstić (Faculty of Electronic Engineering, University of Niš, Serbia); Nenad Petrovic (University of Nis, Faculty of Electronic Engineering, Serbia); Zoran Popovic (Technical College of Vocational Studies, Zvečan, Serbia)

Saturday, September 25, 09:00 - 10:30 (MAESTRAL)

S5: OPTICAL COMMUNICATIONS

Chair: Gordan Ježić (University of Zagreb, Croatia)

Application of ML algorithms for prediction of the QoT in optical networks with imbalanced and incomplete data

Paweł Cichosz (Warsaw University of Technology, Poland); Stanisław Kozdrowski (Warsaw University of Technology & Computer Science Institute, Poland); Sławomir Sujecki (Wrocław University of Science and Technology, Poland)

Modeling demands forecasts with probability distributions in DWDM optical networks

Maria Konieczka and Alicja Poturala (Warsaw University of Technology, Poland); Piotr Sliwka (Cardinal Stefan Wyszyński University in Warsaw, Poland); Sławomir Sujecki (Wrocław University of Science and Technology, Poland); Stanisław Kozdrowski (Warsaw University of Technology & Computer Science Institute, Poland)

MANBo Project: Visually Dissecting the Bologna Metropolitan Area Network through Graphs

Gian Paolo Jesi, Andrea Odorizzi and Andrei Jizdan (Lepida ScpA, Italy); Gianluca Mazzini (LepidaSpA & UniFe, Italy)

Exploit Company Knowledge from Graphs with Banda Calculus

Gian Paolo Jesi and Andrea Odorizzi (Lepida ScpA, Italy); Gianluca Mazzini (LepidaSpA & UniFe, Italy)

Estimation of Cloud-induced Optical Attenuation over Near-Earth and Deep-space FSO Communication Systems

Hristo Ivanov, Pirmin Pezzei and Erich Leitgeb (Graz University of Technology, Austria)

Friday, September 24, 14:00 - 15:30 (ŠIROKO)

S6: SOFTWARE DEVELOPMENT

Chair: Linda Vicković (University of Split, Croatia)

A Comparative Analysis of Agile Teamwork Quality Models

Manuel Silva and Arthur Freire (Intelligent Software Engineering Group, Brazil); Mirko Perkusich (Intelligent Software Engineering Group); Danylo Albuquerque (Intelligent Software Engineering Group, Brazil); Kyller Costa Gorgônio, Hyggo Almeida and Angelo Perkusich (Federal University of Campina Grande, Brazil); Everton Guimaraes (Penn State University, USA)

Function analysis of web services based on REST protocol with selected frameworks

Aneta Poniszewska-Maranda, Maciej Głowiński and Krzysztof Stępień (Lodz University of Technology, Poland)

Game Engines Evaluation for Serious Game Development in Education

Siddeeq Yousif Ameen (Advisor & Duhok Polytechnic University, Iraq); Karzan Sharif (University of Human Development, Sulaymaniyah, Iraq)

IllumiCore: Optimization Modeling and Implementation for Efficient VNF Placement

Leo Popokh (Hewlett Packard Enterprise (HPE) & Southern Methodist University (SMU), USA); Jing Su and Suku Nair (Southern Methodist University, USA); Eli Olinick (SMU, USA)

Friday, September 24, 09:00 - 10:30 (ŠIROKO)

S7: VEHICULAR COMMUNICATIONS

Chair: Ante Kristić (University of Split, Croatia)

Wireless Vehicular Communication: C-ITS Field Measurements Using ITS-G5

Muhammad Naeem Tahir (Finnish Meteorological Institute (FMI) & University of Oulu, Center of Wireless Communication, Finland); Timo Sukuvaara (Finnish Meteorological Institute, Finland)

OTFS Performance Over Different Measured Vehicular 60 GHz Millimeter-Wave Channels

Daniilo Radovic and Christoph F Mecklenbräuer (TU Wien, Austria); Thomas Blazek (Silicon Austria Labs GmbH, Austria)

Link failure anticipation in urban VANET Routing

Nour-EI-Houda Sabilallah (Evolutionary Engineering and Distributed Information System Laboratory & Djilali Liabes University, Algeria); Sofiane Boukli Hacene (Université Djillali Liabès, Algeria)

The Impact of Blocking Cars on Pathloss Within a Platoon: Measurements for 26 GHz Band

Paweł Kryszkiewicz, Adrian Kliks, Paweł Sroka and Michał Sybis (Poznan University of Technology, Poland)

Saturday, September 25, 09:00 - 10:30 (ROOM 5)

P1: POSTERS / ABSTRACTS SESSION

Chair: Marina Prvan (University of Split, Croatia)

Multi-objective optimization in optical networks

Kacper Wnuk (Warsaw University of Technology, Poland); Stanisław Kozdrowski (Warsaw University of Technology & Computer Science Institute, Poland)

Conversion of CVSS Base Score from 2.0 to 3.1

Maciej Roman Nowak, Michał Walkowski and Sławomir Sujecki (Wrocław University of Science and Technology, Poland)

SPECIAL SESSIONS AND SYMPOSIA

SS1: SPECIAL SESSION ON QoS IN WIRED AND WIRELESS NETWORKS

Friday, September 24, 09:00 - 10:30 (LEVANT)

SS1: Special Session on QoS in Wired and Wireless Networks

Chair: Pascal Lorenz (University of Haute Alsace, France)

H.264/AVC and H.265/HEVC Codecs in the IP Environment: a comparison study of QoE, QoS and UX

Tadeus Uhl (Maritime University of Szczecin/Poland, Poland); Christian Hoppe (Nextragen Solutions GmbH, Germany); Janusz Henryk Klink (Wroclaw University of Science and Technology, Poland)

Impact of 5G Network Performance on Augmented Reality Application QoE

Ante Mihaljević, Ana Kešelj and Adriana Lipovac (University of Dubrovnik, Croatia)

Performance Models of a Multidomain IMS/NGN Service Stratum

Sylwester Kaczmarek (Gdansk University of Technology & Faculty ETI, Poland); Maciej Sac (Gdansk University of Technology & Faculty of Electronics, Telecommunications and Informatics, Poland)

SS2: SPECIAL SESSION ON AD HOC&SENSOR NETWORKS AND INTERNET OF THINGS

Friday, September 24, 09:00 - 10:30 (MAESTRAL)

SS2: Special Session on Ad Hoc&Sensor Networks and Internet of Things

Chair: Marin Vuković (University of Zagreb, Croatia)

Energy-Efficient User Clustering for UAV-enabled Wireless Networks Using EM Algorithm

Salim Janji and Adrian Kliks (Poznan University of Technology, Poland)

Freemium Spectrum Sharing and Pricing

Łukasz Kułacz and Adrian Kliks (Poznan University of Technology, Poland)

IoT device deployment for optimal wastewater network coverage

Arkadiusz Sikorski (Warsaw University of Technology, Poland); Stanislaw Kozdrowski (Warsaw University of Technology & Computer Science Institute, Poland); Fernando Solano (Warsaw University of Technology, Poland)

Flash Programming Microcontrollers over the GSM Network

Lubomir Valeriev Bogdanov (Technical University - Sofia & Next Lab Ltd, Bulgaria); Hristo Mitrev (Next Lab Ltd, Bulgaria)

A User Space Implementation of the AODVv2 Routing Protocol

Sergio Machado (Politechnic University of Catalonia, Spain); Israel Martin-Escalona (Universitat Politècnica de Catalunya (UPC), Spain); Enrica Zola (Universitat Politècnica de Catalunya & UPC BarcelonaTECH, Spain); Francisco Barcelo-Arroyo (Universitat Politècnica de Catalunya (UPC), Spain)

Flood forecasting with Bayesian approach

Abbassi Kamel (University Tunis El Manar, Tunisia); Hamadi Lirathni (Tunis el Manar University, Tunisia); Mohamed hechmi Jeridi (University of Tunis El Manar (UTM) National Engineering School of Tunis (ENIT), Tunisia); Tahar Ezzedine (Enit, Tunisia)

SS3: SPECIAL SESSION ON SMART ENVIRONMENTS AND IoT

Thursday, September 23, 11:00 - 12:30 (ŠIROKO)

SS3: Special Session on Smart Environments and IoT

Chair: Maja Stella (University of Split, Croatia)

Acoustic analysis of various purposes rooms using measurements and simulations

Jurica Đerek, Marjan Sikora and Matija Pauković (FESB, University of Split, Croatia); Luka Kraljević (FESB University of Split, Croatia)

IoT Technologies Offer New Potentials for People with Disabilities

Martina Antonic (University of Zagreb, Croatia)

Smart City Concept using BI/BO Model for the Ticket System in Urban Transport

Lumbardha Hasimi, Aneta Poniszewska-Maranda and Tomasz Krym (Lodz University of Technology, Poland)

DNN Architectures and Audio Representations Comparison for Emotional Speech Classification

Lukasz Smietanka and Tomasz Maka (West Pomeranian University of Technology, Szczecin, Poland)

Current trends in IoT research

Luka Tomat (University of Ljubljana, Slovenia)

SS4: SPECIAL SESSION ON SECURITY AND DIGITAL FORENSICS

Friday, September 24, 16:00 - 17:30 (ŠIROKO)

SS4: Special Session on Security and Digital Forensics

Chair: Toni Perković (University of Split, Croatia)

Ranking Network Devices for Alarm Prioritisation: Intrusion Detection Case Study

Kristijan Vidović and Ivan Tomičić (University of Zagreb, Croatia); Karlo Slovenec and Miljenko Mikuc (University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia); Ivona Brajdic (University of Zagreb, Croatia)

Automatic CVSS-based vulnerability prioritization and response with context information

Michał Walkowski and Jacek Oko (Wroclaw University of Science and Technology, Poland); Maciej Krakowiak (DSecure, Poland); Sławomir Sujecki and Marcin Jaroszewski (Wroclaw University of Science and Technology, Poland)

Cache Pollution Attack in the NDN Architecture: Impact and Analysis

Abdelhak Hidouri (Hatem Bettahar IResCoMath Research Unit, Tunisia); Mohamed Hadded (VEDECOM, France); Hajlaoui Nasreddine (University of Gabes, Tunisia); Haifa Touati (Faculty of Sciences of Gabes & Hatem Bettahar IResCoMath Research Unit, Tunisia); Paul Muhlethaler (INRIA, France)

A Decentralized and Reliable Election-based Key Management Protocol for Communicating Things

Ramy Chemak (INSA Centre Val de Loire & Heudiasyc UMR CNRS 7253, France); Hicham Lakhlef (Université de Technologie de Compiègne, France); Abdelmadjid Bouabdallah (Université de Technologie - Compiègne, France)

Let's Create! Automated Certificate Management for End-users

Tobias Mueller and Adrian Michalek (Uni Hamburg, Germany)

SS5: SPECIAL SESSION GREEN NETWORKING AND COMPUTING

Friday, September 24, 14:00 – 15:30 (MAESTRAL)

SS5: Special Session on Green Networking and Computing

Chair: Josip Lorincz (University of Split, Croatia)

Experiments on energy optimization in smart residences
René Nolio Santa Cruz, Hugo Sampaio, Ricardo N Boing and Carlos Becker Westphall (Federal University of Santa Catarina, Brazil)

Energy Harvesting by Optical Rectenna for RFID and IoT Applications

Chokri Baccouch (National Engineering School of Tunis, Tunisia); Chayma Bahar (MACS Research Laboratory, National Engineering School of Gabes, Tunisia); Hedi Sakli (EITA Consulting, France)

Hardware implementation of IDP and LINC methods using real power amplifiers

Khaled Tahkoubit (University of Sciences and Technology of Oran, Mohammed Boudiaf (USTO-MB) & Laboratory of Coding LACOSI, Algeria); Hmaied Shaiek and Christophe Alexandre (CNAM, France); Salim Faci and Daniel Roviras (Cnam, France); Adda Ali-Pacha (University of Science and Technology of Oran(USTO), Algeria)

SS6: SPECIAL SESSION ON ADVANCES IN DATA ANALYTICS

Saturday, September 25, 09:00 - 10:30 (ŠIROKO)

SS6: Special Session on Advances in Data Analytics

Chair: Toni Mastelić (Ericsson Nikola Tesla, Croatia)

Machine learning approach in fire risk estimation

Ivana Nizetic Kosovic and Diana Škurić Kuraži (Ericsson Nikola Tesla, Croatia)

Machine Learning-Based Model Selection for Anomalous Wireless Link Detection

Gregor Cerar (Jozef Stefan Institute & Jozef Stefan International Postgraduate School, Slovenia); Halil Yetgin (Bitlis Eren University, Turkey & Jozef Stefan Institute, Slovenia); Carolina Fortuna (Jozef Stefan Institute, Slovenia)

Runtime Metric Analysis In NoSQL Database Performance Benchmarking

Camelia Florina Andor (Babes-Bolyai University, Romania)

Text Analysis of the Hybrid Digital Corpora

Hrvoje Karna, Anita Gudelj and Silvana Kokan (University of Split, Croatia)

N-gram Based Croatian Language Network

Magdalena Simunec (University of Zagreb, Croatia); Renato Soic and Marin Vukovic (University of Zagreb Faculty of Electrical Engineering and Computing, Croatia)

SS7: SPECIAL SESSION ON ENVIRONMENTAL ELECTROMAGNETIC COMPATIBILITY (EEMC)

Thursday, September 23, 14:30-16:00 (ŠIROKO)

SS7: Special Session on Environmental Electromagnetic Compatibility (EEMC)

Chair: Dragan Poljak (University of Split, Croatia)

Finding an Optimal Sample Size and Placement for Measurement of Relative Permittivity using a Microstrip Ring Resonator

Miroslav Joler (University of Rijeka, Croatia); Alex Noel Joseph Raj (Shantou University, China); Juraj Bartolić (University of Zagreb, Croatia)

Relaxing the Variational Method-based Measurement Configuration for the Evaluation of Permittivity using a Microstrip Ring Resonator

Miroslav Joler (University of Rijeka, Croatia); Alex Noel Joseph Raj (Shantou University, China)

Assessment of Transmitted Power Density due to Radiation from Dipole Antenna of Finite Length - Part I: Theoretical background and current distribution

Dragan Poljak (University of Split, Croatia); Anna Šušnjara (University of Split & FESB, Croatia); Ana Džolić (FESB, Croatia)

Assessment of Transmitted Power Density due to Radiation from Dipole Antenna of Finite Length - Part II: Transmitted field, volume power density and transmitted power density

Dragan Poljak (University of Split, Croatia); Anna Šušnjara (University of Split & FESB, Croatia); Ana Džolić (FESB, Croatia)

A Note on the Calculation of the Power Flow along a Straight Thin Wire Scatterer Horizontally Located above a Lossy Ground

Dragan Poljak (University of Split, Croatia); Vicko Doric (University of Split, FESB, Croatia)

Study on the Suitability of Numerical Integration at 5G Frequencies Using Unit Cube Test

Mario Cvetković (University of Split, Croatia); Dragan Poljak (University of Split, FESB, Croatia); Ante Lojić Kapetanović (University of Split, Croatia); Hrvoje Dodig (University of Split, Faculty of Maritime Studies & Naval Electronic Center, PCE, Croatia)

SS8: SPECIAL SESSION ON ADVANCED EDUCATIONAL TECHNOLOGIES

Friday, September 24, 16:00 - 17:30 (MAESTRAL)

SS8: Special Session on Advanced Educational Technologies

Chair: Ani Grubišić (University of Split, Croatia)

Studio Based Learning of Instructional Design in an Online Environment

Matea Markić Vučić (SPARK School, Bosnia and Herzegovina); Slavomir Stankov (University of Split, Croatia)

DWDM Network Laboratory Solution for Telecommunication Education Engineering

Sylwester Kaczmarek (Gdansk University of Technology & Faculty ETI, Poland); Magdalena Młynarczuk (Gdańsk University of Technology & Faculty ETI, Poland)

Coding Training Proposal from Kindergarten to High School

Elisa Benetti (LepidaScpA, Italy); Gianluca Mazzini (LepidaSpA & UniFe, Italy)

TIMETABLE A: TECHNICAL PROGRAM, SYMPOSIA

Thursday, September 23 (hybrid)			
Time/Hall	LEVANT	MAESTRAL	ŠIROKO
08:00-10:30	REGISTRATION		
10:30-11:00	Coffee Break		
11:00-12:30	S1: Machine Learning Applications	S2/I: Signal Processing and Coding I	SS3: Special Session on Smart Environments and IoT
12:30-14:00	Lunch		
14:00-14:30	Invited Talk (BURA): Marcelo Sampaio de Alencar (Institute for Advanced Studies in Communications (Iecom)), The New Economic Attitude in the Information Era		
14:30-16:00	S4: Wireless Communications	S2/II: Signal Processing and Coding II	SS7: Special Session on Environmental Electromagnetic Compatibility (EEMC)
16:00-16:30	Coffee Break		
17:00 – 18:30	Walking Tour in Hvar		

Friday, September 24 (hybrid)			
Time/Hall	LEVANT	MAESTRAL	ŠIROKO
08:00-09:00	REGISTRATION		
09:00-10:30	SS1: Special Session on QoS in Wired and Wireless Networks	SS2: Special Session on Ad Hoc&Sensor Networks and Internet of Things	S7: Vehicular Communications
10:30-11:00	Coffee Break		
11:00-12:00	Keynote Speech: Elena Fersman (Head of Global AI Accelerator, Ericsson), AI for Telecom and Beyond (BURA)		
12:00-14:00	Conference Luncheon		
14:00-15:30	SS5: Special Session on Green Networking and Computing	SYM1/I: Symposium on Robotics and ICT Assisted Wellbeing I	S6: Software Development
15:30-16:00	Coffee Break		
16:00-17:30	SS8: Special Session on Advanced Educational Technologies	SYM1/II: Symposium on Robotics and ICT Assisted Wellbeing II	SS4: Special Session on Security and Digital Forensics
17:30-19:00	Walking Tour in Hvar		
20:00	Conference Dinner		

Saturday, September 25 (hybrid)			
Time/Hall	LEVANT	MESTRAL	ŠIROKO
09:00-10:30	S3: 5G & B5G Technologies	S5: Optical Communications	SS6: Special Session on Advances in Data Analytics
10:30-11:00	Coffee Break		
11:00-12:00	Conference Closing Gathering		

TIMETABLE B: WORKSHOPS, TUTORIALS, BUSINESS FORUM

Thursday, September 23 (hybrid)		
Time/Hall	BURA	JUGO
08:00-09:00	REGISTRATION	
09:00-10:30	Tutoria T1 (D. Poljak and M. Cvetković) <i>Humans Exposure to Electromagnetic Fields (JUGO)</i>	
10:30-11:00	Coffee Break	
11:00 – 12:30	Tutorial T2 (M. Joler) A Review of Material Characterization Techniques with an Emphasis on a Microstrip Ring-resonator Method	Tutorial T3 (I. Slapničar) <i>Data Clustering in Julia Part 1</i>
12:30-14:00	Lunch	
14:00-14:30	Invited Talk (BURA): Marcelo Sampaio de Alencar (Institute for Advanced Studies in Communications (Iecom)), The New Economic Attitude in the Information Era	
14:30-16:00	Tutorial T3 (I. Slapničar) <i>Data Clustering in Julia Part 2 (JUGO)</i>	
16:00-16:30	Coffee Break	
17:00-18:30	Walking Tour in Hvar	

Friday, September 24 (hybrid)		
Time/Hall	BURA	JUGO
08:00-09:00	REGISTRATION	
09:00-10:30	10th Workshop on Software Engineering in Practice (WSEP)	SMART CITIES AND ADVANCED TECHNOLOGIES Workshop on Advanced Technologies: Sensors, Robots, 5G, HPC, ML/AI – Driving Force for Development of Smart Cities – Use Cases
10:30-11:00	Coffee Break	
11:00-12:00	Keynote Speech: Elena Fersman (Head of Global AI Accelerator, Ericsson), AI for Telecom and Beyond (BURA)	
12:00-14:00	Conference Luncheon	
14:00-15:30	WESC: Ericsson Nikola Tesla Summer Camp 2021 Workshop	SYM2: Symposium on Information Security and Intellectual Property (ISIP) Invited talk: Dinka Šago
15:30-16:00	Coffee Break	
16:00-17:30	iPANEL: Summer Camp Innovation Challenge (BURA)	
17:30-19:00	Walking Tour in Hvar	
20:00	Conference Dinner	

Saturday, September 25 (hybrid)		
Time/Hall	BURA	JUGO
09:00-10:30	WIICT/I: Workshop on ICT I	P1: Posters/Abstracts Session
10:30-11:00	Coffee Break	
11:00-12:00	Conference Closing Gathering	

SYM1/I: SYMPOSIUM ON ROBOTICS AND ICT ASSISTED WELLBEING I

Friday, September 24, 14:00 - 15:30 (LEVANT)

SYM1/I: Symposium on Robotics and ICT Assisted Wellbeing I

Chair: Mirjana Bonković (University of Split, Croatia)

A software toolbox for behavioral analysis in robot-assisted special education

Chris Lytridis (International Hellenic University, Greece); Vassilis G. Kaburlasos (International Hellenic University (IHU) & HUMAN-MACHINES INTERACTION (HUMAN) Lab, Greece); Christos Bazinas (International Hellenic University (IHU), Greece); George A Papakostas and Cristina I. Papadopoulou (International Hellenic University, Greece); Vasiliki Aliko Nikopoulou (Papageorgiou General Hospital, Greece)

A Study on Text Classification for applications in Special Education

Lemonia Karathanasi (International Hellenic University, Greece); Vassilis G. Kaburlasos (International Hellenic University (IHU) & HUMAN-MACHINES INTERACTION (HUMAN) Lab, Greece); Christos Bazinas and Grigorios Jordanou (International Hellenic University (IHU), Greece)

Multimodal Segmentation Neural Network to Determine the Cause of Damage to Grasslands

Maximilian Johenneken (Bonn-Rhein-Sieg University of Applied Sciences, Germany); Ahmad Drak (Hochschule Bonn-Rhein-Sieg, Germany); Rainer Herpers and Alexander Asteroth (Bonn-Rhein-Sieg University of Applied Sciences, Germany)

Design of a Sensor System for a Minimalistic Walking Robot with Two Degrees of Freedom

Lyubomira Miteva (Sofia University, Bulgaria); Ivan Chavdarov (Institut of Robotics, Bulgarian Academy of Sciences & Sofia University "St. Kliment Ohridski", FMI, Bulgaria); Kaloyan M Yovchev (Sofia University, Bulgaria); Bozhidar Naydenov (Dassault Systemes & Institut of Robotics, Bulgarian Academy of Sciences, Bulgaria)

SYM1/II: SYMPOSIUM ON ROBOTICS AND ICT ASSISTED WELLBEING II

Friday, September 24, 16:00 - 17:30 (LEVANT)

SYM1/II: Symposium on Robotics and ICT Assisted Wellbeing II

Chair: Mirjana Bonković (University of Split, Croatia)

On Olive Groves Analysis using UAVs

Vladan Papic, Nediljko Bugarin and Josip Gugić (University of Split, Croatia)

Augmented reality for an efficient inspection of outfitting process in shipbuilding

Mario Miličević, Marin Stefan Vidović and Mirjana Bonković (University of Split, Croatia); Ana Kuzmanić Skelin (Faculty of Electrical Engineering, Croatia); Boris Ljubenković (University of Split, Croatia); Ratko Mimica and Ivana Željko (Div Group, Split Shipyard, Croatia)

Head Movements of 3D Virtual Head in HMI Systems using Rigid Elements

Maja Kocoń (West Pomeranian University of Technology, Szczecin, Poland)

Towards Supervised Robot-assisted Physical Therapy after Hand Fractures

Ivan Hrabar and Bruno Čelan (University of Zagreb, Croatia); Dora Matic (University of Zagreb Faculty of EE&C, Croatia); Nikola Jerković and Zdenko Kovacic (University of Zagreb, Croatia)

PROFESSIONAL PROGRAM

Saturday, September 25, 09:00 - 10:30 (BURA)

WICT/I: Workshop on Information and Communication Technologies I

Chair: Duje Čoko (University of Split, Croatia)

Communication parameter testing of remotely controlled unmanned aerial vehicles (UAV)

Mato Kovčalića (University of Zagreb, Croatia); Krešimir Malarić (University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia)

VR-Evacuation training for cruise-ships with a focus on people with disabilities

Yvonne Prinzellner, Alisa Simon and Sabrina Scheuer (Johanniter Österreich Ausbildung und Forschung Gemeinnützige GmbH, Austria); Georg Aumayr (Johanniter Österreich Ausbildung und Forschung gem. GmbH, Austria); Andreas Peer (MasterMind Development GmbH, Austria)

Analysis of the Influence of the Earthing Resistance of Pylons on the Performance of the HVAC Line Facing Electromagnetic Transient Lightning

Anthony Bassetuka Sandoka (ISTA/KINSHASA, Democratic Republic of the Congo)

Integration criteria of environmental data of two real projects: Sensornet and PAIoT network

Stefania Nanni (Lepida ScpA, Italy); Gianluca Mazzini (University of Ferrara and LepidaSpA, Italy)

Friday, September 24, 14:00 - 15:30 (JUGO)

SYM2: SYMPOSIUM ON INFORMATION SECURITY AND INTELLECTUAL PROPERTY (ISIP)

ISIP INVITED TALK: DINKA ŠAGO

SOME ASPECTS OF LEGAL REGULATION OF GENETICALLY MODIFIED FOOD

Dinka Šago, PhD

University of Split Faculty of Law, Croatia

Summary:

Food nowadays is recognised by policy makers to play an important role in improving health and quality of life, based on evidence that a healthy diet is not only in the interest of individuals (obesity and mortality) but also influencing the cost of public health care and productivity of the working population. On 25 October 2011, the European Parliament and Council adopted Regulation (EU) No 1169/2011 on the provision of food information to consumers (the FIC Regulation). The FIC Regulation modifies existing food labeling provisions in the Union to allow consumers to make informed choices and to make safe use of food, while at the same time ensure the free movement of legally produced and marketed food. Some aspects of the provision of information to consumers should be complemented by specific rules in order to prevent unfair business practices. In the field of GMO tracking and labelling, manufacturers must comply with Regulation (EC) No 1831/2003 of the European Parliament and of the Council of 22 September 2003 concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms and amending Directive 2001/18/EC. The provision of detailed food information provides consumers with key information on the nature and characteristics of a foodstuff. Only GMO products that have been approved in the European Union can be obtained on the European market. The legal framework regulating the labeling of the food is made so that it guarantees consumers access to complete information about the content and composition of the product, which protects their health and interests.

Biography:

Dinka Šago is Associate Professor at the Chair for Civil Procedure Law, Faculty of Law University of Split, Croatia. She has graduated at the Faculty of Law in Split. She worked as judicial trainee at the Municipal Court in Split and she has passed Bar Exam. In 2010. she finished Post-graduate Study in Civil and Family Law sciences and won a master's degree of law at Faculty of Law University of Zagreb. At the Faculty of Law, University of Split she has graduated defending PhD dissertation in 2012. She was a member of research team in the scientific project of the Faculty of Law in Maribor „Recognising and implementing court decisions in the national systems of Croatia and Slovenia and within the area of the European court“. She is the co-author of three books, author and co-author of the scientific papers in Croatian and English language and she had lectures on national and international congresses. From 1st February to 1st March 2009 stayed on student residence at Faculty of Law, Free University in Berlin, Germany within the Tempus project JEP-41011-2006. She has also educated herself at Faculty of Law University of Maribor, Europa-Institut Saarbrücken, Faculty of Law, University of Zaragoza. Since 1. October 2014. she is a Head of the “Institute for cooperation with economic institutions” on Faculty of Law University of Split. She participates in teaching courses in Civil Procedure Law, European Civil Procedure Law, Non-contentious law, Organisation of the judiciary, Croatian and european enforcement law and Notary law. From October 2018 she is Vice-dean for Science and Postgraduate Studies at the Faculty of Law, University of Split and she participates in the work of numerous boards and commissions at the Faculty of Law and University of Split.

SYM2: Symposium on Information Security and Intellectual Property (ISIP)

Co-Chairs: Marija Boban (University of Split, Croatia) and Gordana Ježić (University of Zagreb, Croatia)

Cybercrime Measures and Data as Evidence

Marija Boban and Ivan Vukušić (University of Split Faculty of Law, Croatia)

Frequency of electronic violence in the student population and procedural mechanisms of protection

Ivana Stipanović, Ilija Krišto and Mirela Mabić (University of Mostar, BiH)

TUTORIALS

TUTORIAL T1

Thursday, September 23 09:00-10:30 (JUGO)

Dragan Poljak and Mario Cvetković, PhD
University of Split, FESB Split, Croatia

Humans Exposure to Electromagnetic Fields

Abstract: This Tutorial is mainly based on the book, D. Poljak, M. Cvetkovic, Human Interaction with Electromagnetic Fields; Computational Models in Dosimetry, Elsevier 2019, and on some recent journal papers. Tutorial aims to cover several aspects of human interaction with non-ionizing electromagnetic fields (EMF) including not only the undesired exposure from artificial sources, but also the biomedical applications of electromagnetic fields. The tutorial deals with basic aspects of electromagnetic fields in environment, coupling mechanisms between humans and electromagnetic fields, established biological effects of electromagnetic fields from static to high-frequency range, international safety guidelines related to limiting human exposure to those fields, including relevant exposure limits and safety guidelines, electromagnetic-thermal dosimetry models and the related analytical/numerical solution methods. First, theoretical/experimental methods of incident field dosimetry for the assessment of external fields due to low frequency (LF) and high frequency (HF) sources are presented in detail. Illustrative examples include analysis of power lines, transformer substations, PLC systems, RFID antennas and radio base stations pertaining to 2G/3G/4G and 5G mobile communication systems. Then, the tutorial presents some electromagnetic-thermal dosimetry methods for the assessment of human exposure to low frequency (LF), high frequency (HF) and transient electromagnetic radiation featuring the use of integral/differential equation formulations and related numerical solution procedures (primarily based on the use of Boundary Element Method – BEM, and Finite Element method – FEM) for the calculation of induced current densities, internal fields, specific absorption rate (SAR), incident power density (IPD), transmitted power density (TPD) and specific absorption (SA). Also, for HF exposures the related temperature increase in tissues is of interest. In particular, for GHz frequency range, as far as 5G systems are concerned, a surface temperature elevation on the air-body interface is considered. Computational examples pertaining to various 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. The obtained numerical results for induced current densities, internal fields, SAR, IPD, TPD and SA are compared against exposure limits proposed by recently issued ICNIRP 2020 (International Commission on Non Ionizing Radiation Protection). This is followed by some examples of biomedical applications of electromagnetic fields, including the transcranial magnetic stimulation (TMS), transcranial electrical stimulation (TES), but also some electrotherapy and magnetotherapy techniques. Also, some illustrative computational examples pertaining to thermal modeling of certain ophthalmological procedures will be given. Finally, the last part of the Tutorial deals with the stochastic modeling of electromagnetic fields. Namely, the input parameters of models used in bioelectromagnetism and electromagnetic dosimetry suffer from inherent uncertainty. The values of body tissue parameters such as permittivity and the electrical conductivity vary significantly, depending on the age and gender, but also between healthy and ill individuals. Moreover, they are obtained under different measurements on ex vivo animal and human tissues, and show large variations from their averages. When used in a computational model, these average values result in approximation of the realistic scenario. The models used in bioelectromagnetics and numerical dosimetry are computationally rather demanding as they represent tremendously complex physical phenomena. Despite the progress in high-performance calculation, uncertainty quantification (UQ) based on traditional Monte Carlo method is still an enormous burden regarding computational cost. Therefore, alternative methods such as generalized polynomial chaos and stochastic collocation have become of interest to many researchers in this research area. In this tutorial, an outline of the application of stochastic collocation (SC) together with some illustrative examples are given.



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 carrier achievements, such as National Prize for Science (2004), Croatian section of IEEE annual Award (2016). In 2011 professor Poljak became a member of WIT Board 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 one COST project, ITER physics EUROfusion collaboration and one national center for excellence in research for technical sciences. He served a co-chair of Working Group 2 of IEEE/International Committee on Electromagnetic Safety (ICES) Technical Committee 95 SC6 EMF Dosimetry Modeling. In 2019 Prof Poljak was included in numerous activities dealing with human exposure to electromagnetic fields. In the first half of the year a new edition of the chapter; Poljak, D., 2019. "Electromagnetic Fields: Environmental Exposure. In: Nriagu, J. (Ed.), *Encyclopedia of Environmental Health*. Elsevier, vol. 2, pp. 287–299. <https://dx.doi.org/10.1016/B978-0-12-409548-9.02005-4>, © 2019 Elsevier B.V. was published. In June 2019 Prof. Poljak, together with M.Cvetkovic, published a book entitled: *Human Interaction with Electromagnetic Fields; Computational Models in Dosimetry*, by Elsevier. In July 2019 Dragan Poljak received the Technical Achievement Award of the IEEE EMC society Technical Achievement Award for contributions to computational dosimetry for human exposure to electromagnetic fields. In December 2019 Prof Poljak lectured at PhD School 5G International PhD School 2019. From the beginning of 2019 he has been participating intensive activities in IEEE/ICES TC95 Subcommittee 6 EMF Dosimetry Modeling; WG5: Definition of Incident Power Density related to dosimetry of 5G radiation.



Biography: Mario Cvetković received his BSc in electrical engineering from the University of Split, Croatia in 2005. In 2009 he obtained MPhil degree from the Wessex Institute of Technology, University of Wales, UK. In December 2013 he received PhD from University of Split, Croatia. He is assistant professor at the Faculty of electrical engineering, mechanical engineering and naval architecture (FESB), University of Split where he teaches fundamentals of electrical engineering course. In 2010, he held a seminar to graduate and postgraduate students at the Technical University of Ilmenau, Germany, and in 2014 and 2018 he held seminars to PhD students on the numerical methods in engineering at the Malardalen University, Vasteras, 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 more than 50 journal and conference papers and several book chapters (including those for CRC Press and Springer). He is a member of the IEEE/International Committee on Electromagnetic Safety (ICES) Technical Committee 95 SC6 EMF Dosimetry Modeling.

Miroslav Joler, PhD*University of Rijeka, Croatia***A Review of Material Characterization Techniques with an Emphasis on a Microstrip Ring-resonator Method**

Abstract: Material characterization plays an important role in modern research and design. To properly design electronic/electromagnetic circuits, it is essential to know electromagnetic (EM) properties of given materials. In a broader sense, knowing EM properties is not only vital for the circuit design, but also for the analyses of other products, such as food, chemicals, body tissue, fabrics etc. Capability to determine properties of the chosen material is instrumental when using non-standard materials that are typically not accompanied by a data sheet listing electromagnetic properties of the material. The first part of this tutorial will contain a review of multiple methods that have been established to enable characterization of EM properties of materials. Presented methods will be described in terms of their measurement principle and apparatus, measurement conditions, method applicability with benefits, and limitations. In the second part, emphasis will be put on the microstrip-based ring-resonator method. The resonator design and various measurement approaches will be discussed through examples, with their sensibilities and impact on the result. The results of some analytical and numerical models will be compared to results of the respective measurements, discussing aspects that entail measurement and computational uncertainties. The tutorial will conclude with a possible expansion of the method applicability range.



Biography: Miroslav Joler received his B.S. degree in electrical engineering from the University of Zagreb, Croatia, in 1996, and his M.S. and Ph.D. degrees in electrical engineering from the University of New Mexico, Albuquerque, NM, USA, in 2001 and 2006, respectively. In 2006, he was a postdoctoral research associate with Portland State University, Portland, OR, USA. In 2007, he joined the University of Rijeka, Croatia, where he has founded a Wireless Communications Lab, and served as Chair of Computer Engineering Department, amongst other duties. His industry experience includes a position of an RF engineer with Croatian Radio and Television from 1996 to 1999. He has published in prominent scientific journals and served as session (co)chair, and technical program committee member at international conferences. He is an Editorial Board Member of two international scientific publishers and an Associate Editor of an international scientific journal. In 2017, he was elected to Associate level of Croatian Academy of Engineering. His current research interests include development of smart clothing, wearable and reconfigurable circuits, biomedical applications of electromagnetics, and wireless power transfer.

Ivan Slapničar, PhD*University of Split, Croatia***Data Clustering in Julia**

Abstract: The lecture materials are reactive Pluto notebooks in Julia language. Basic linear algebra knowledge is assumed. The notebooks are available at <https://ivanslapnicar.github.io/Data-Clustering-in-Julia.jl/>. The tutorial consists of two blocks. In the first block, short introduction to Julia and its eco system will be given, followed by the lecture on k-means algorithm for data clustering and package Clustering.jl. The second block consists of lectures on spectral graph bi-partitioning, spectral graph k-partitioning, and spectral partitioning of bipartite graphs, followed by an application to clustering of textual data using terms-document matrix and packages TextAnalysis.jl and Languages.jl.



Biography: Ivan Slapničar received his BSc in 1984, his MSc in 1988 in Mathematics from the University of Zagreb, Croatia, and PhD (dr. rer. nat.) in Mathematics in 1992 from the Fernuniversität Hagen, Germany. He is Professor and Head of the Chair for Mathematics at the Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture at the University of Split. His research interests include linear algebra, numerical linear algebra and applications. Professor Slapničar was Visiting Professor at the Utah State University in 2001/02, Visiting Researcher at TU Berlin with the FP7 People “Marie Curie” Intra-European Fellowship in 2009/10, and Fulbright-Schuman International Educator/Lecturer at MIT in 2014, where he worked closely with the Julia group. In 2016 he taught GIAN Course “Modern Applications of Numerical Linear Algebra” at IIT Indore, India, which was entirely prepared in Julia. To date Professor Slapničar has published more than 20 journal papers and was and is PI in several national scientific grants.

BUSINESS FORUM

Friday, September 24, 14:00-15:30 (BURA)

WESC: ERICSSON NIKOLA TESLA SUMMER CAMP 2021 WORKSHOP

Ericsson Nikola Tesla Summer Camp is a summer workshop for students from Croatian and universities from the region. The first Summer Camp was organized back in 2001 and since then more than 600 students participated. Students work five weeks on real problems in real industrial environment with mentors both from the company and universities. This year Summer Camp celebrates 20th anniversary.

Moderators:



Ivana Nizetic Kosovic, Ericsson Nikola Tesla d.d., Split

Ivana Nizetic Kosovic obtained her diploma in mathematics at Faculty of Science in Zagreb and completed her PhD at Faculty of Electrical Engineering and Computing, where she was working as an assistant professor. Her scientific interests include spatio-temporal reasoning, artificial intelligence and heterogenous data analysis. She is a researcher at Ericsson Nikola Tesla d.d., Research department.



Toni Mastelic, Ericsson Nikola Tesla d.d., Split

Toni Mastelic is a researcher at Ericsson Nikola Tesla d.d., Research department. He did his bachelor and masters studies in Computer Science at the University of Split, FESB, Croatia, where he received his Bachelor degree in 2009, and Master degree in 2011. Afterwards, he worked as a research and later on as university assistant at Vienna University of Technology, where he pursued his PhD. Finally, he received his PhD degree in 2015 at the Institute of Software Technology and Interactive Systems, Vienna University of Technology.

Summer Camp projects:

Smartlab Digital Twin

Team members: Ante Turalija, Dina Cvitanovic, Ivana Kozul
Mentors: Toni Mastelic, Ivana Nizetic Kosovic

Signal Type Recognition

Team members: Domina Sokol, Ivana Boko, Josipa Marelja
Mentors: Jelena Culic Gambiroza, Mario Cagalj, Toni Mastelic, Ivana Nizetic Kosovic

Weather Forecasting using Machine Learning

Team members: Iva Madunic, Marin Peric, Veronika Ozretic
Mentors: Ivana Nizetic Kosovic, Toni Mastelic, Diana Skuric Kurazi

Satellite Observation In Land condition (SOIL)

Team members: Ivan Culin, Maria Katic, Toni Juric
Mentors: Diana Skuric Kurazi, Ivana Nizetic Kosovic

AGenDA: Analysis of Genomic Data for disease progression

Team members: Valentina Cokic, Marija Jukic, Filip Wolf
Mentors: Ivana Stupar

WaterQ – Digital assistant

Team members: Marko Jankuleski, Julija Kvesic, Tin Kranzelic, Dunja Smigovec
Mentors: Goran Kopcak

AR Smart City

Team members: Marko Tamarut
Mentors: Damir Kljajic, Slaven Ivic, Kresimir Vidovic

Drone inspection for safe equipment installation

Team members: Dora Klobucar, Luka Penjin, Anamarija Jelic
Mentors: Robert Cicek, Filip Novacki

Drone inspection of critical infrastructure

Team members: Luka Lukacevic, Matea Musladin, Robert Travancic
Mentors: Barbara Pavelic Grbic, Antun Kukolja, Hrvoje Rudes

Ericsson Dynamic Activation front end application

Team members: Ibrahim Filandra, Iva Stojcic
Mentors: Domagoj Palata, Mario Cacic

eTTS - Ericsson Nikola Tesla Text-to-Speech

Team members: Ivana Galic, Andre Garisic, Vjeko Glibota, Matija Santek
Mentors: Snjezana Drazenovic Djoja, Mateo Majstorovic

Real-time anomaly detection in Pharaon

Team members: Mislav Has, Dominik Sabljak
Mentors: Miran Mosmondor, Andrej Grguric

Friday, September 24, 9:00 – 10:30 (JUGO and on-line)

SMART CITIES AND ADVANCED TECHNOLOGIES

Workshop on Advanced Technologies: Sensors, Robots, 5G, HPC, ML/AI – Driving Force for Development of Smart Cities – Use Cases

Smart Cities use digital technology for strengthening citizens' welfare and to improve their quality of life while at the same time taking care of the preservation of the environment and natural resources in accordance with the UN Sustainable Development Agenda. Technology plays a key role to rethink the way smart city is organized. It helps to gather information, to deploy efficient solutions and policies and to enable new communication channels relying upon broadband and mobile technology, big data, cloud and HPC services, artificial intelligence and machine learning, sensors, hyperconnectivity, etc.

Within this workshop, vision and preliminary main strategical goals of the City of Split Smart City Strategy will be presented and discussed. Also, particular smart city solutions will be presented and discussed as well as some research projects whose results could contribute to the novel smart city solutions.

Agenda:

9:00-9:15	Presentation of the preliminary proposal of the Split Smart City Strategy 2020. – 2030., Sven Gotovac;
9:15-9:30	Smart city platform „OneCity App“, Nenad Marjanović - Combis d.o.o, <i>OneCity app is a platform that enables the exchange of information and communication of citizens with the city, the integration of city data, unique payment of citizens' bills, smart decision-making and analytics for the needs of the city. Combis' approach to smart cities with "Smart City" solutions is based on Boyd Cohen's customized definition, which reads: "Smart cities use information and communication technologies (ICT) to make intelligent decisions in a more intelligent and efficient way for using resources, resulting in cost and energy savings, improved service delivery and quality of life, and reduced environmental footprint - all supporting innovation and the low-carbon economy. "</i>
9:30-9:45	Smart City Data Centre &HPC Infrastructure – Hrvoje Strepački, Atos Convergence Creators Ltd.
9:45-10:00	5G, HPC, ML/AI technology driving force for Smart City – use cases poster session – short presentation Sven Gotovac
	Split port surveillance using artificial intelligence and high-performance computing, Sven Gotovac, Luka Matić, Vladan Papić, Dunja Božić Štulić, Hrvoje Turić, Vladimir Pleština
	Medical Image processing – Ana Pinjuh, Dunja Božić-Štulić, Linda Vicković, Sven Gotovac
	Artificial Intelligence in Automated Document Processing Example: Date Detection and Recognition from Stamped Samples, Zrinka Gligo, Linda Vicković, Tamara Grujić, Sven Gotovac
	HPC in education:
	Colab service + Jupyter – C++ example – Dunja Božić-Štulić, Sven Gotovac
	ML + Jupyter + Colab – Python – Dunja Božić-Štulić, Ana Pinjuh, Sven Gotovac
	Smart City, HPC, ML/AI as opportunity for Start-ups
10:00-10:30	Discussion

Moderatori:

- **Nenad Marjanović, Combis d.o.o.**
- **Hrvoje Strepački, Atos Convergence Creators Ltd.**
- **Sven Gotovac, University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture**



Nenad Marjanović, Smart City lead within Combis d.o.o. has 28 years of experience in IT industry, with focus on Product Management, Business Management, Sales, Delivery and Operations Management. Author of several HPE corporate sales tools. Managed business programs for Central Eastern Europe, Israel and Russia subregion (CEEI). Recognized also as coach, mentor and lecturer providing professional education for Hewlett-Packard Enterprise. Guest lecturer at Zagreb School of Economy and Management (MBA and EMBA study programs), speaker and trainer on numerous conferences, events and workshops. Responsible for the Smart City portfolio of business solutions development program Combis d.o.o. Gained experience in an international environment as a PMO consulting manager of HP Technology Consulting Group. The last 10 years have a special focus on Smart City solutions and IoT applications.



Hrvoje Strepački, Atos Convergence Creators d.o.o., Zagreb is Head of HPC & Quantum at Atos Global Delivery Center in Zagreb. He has a university degree from University of Zagreb, Department of Mathematics since 1998. and Executive MBA degree from Cotrugli Business School, Zagreb since 2014. Hrvoje has extensive experience in software development and service delivery in both telecom and enterprise segments. He was president of Croatian Competitiveness Cluster for ICT Industry from 2013 until 2017 and is a member of Executive Committee of Croatian Employers Association – ICT Section. His professional career includes international experience. From year 2000 until 2017 Hrvoje worked at Ericsson, from 2017 until 2018 at Sedam IT as Director of Software Development and Business Solutions. In 2018, Hrvoje joined Atos Convergence Creators, first as Head of Space & Avionics and from this year assumed the role of Head of HPC & Quantum.



Sven Gotovac works from 1984 at the University of Split, Faculty of Electrical Engineering, Mechanical Engineering, and Naval Architecture. He received PhD degree at Technical University Berlin in 1993. Currently he is full professor and head of the Chair of Computer Architecture and Operating Systems. He collaborated at the eight national and two international research projects, while he has been leader of two national research projects. Currently, he leads one international project at the ALICE experiment in CERN. Also, he was leader of more than thirty projects in collaboration with industry, national and local government. He was Dean of the University of Split, Faculty of Electrical Engineering, Mechanical Engineering, and Naval Architecture from 2015. to 2020. He is co-author of about four hundred scientific papers in indexed journals cited more than 20.000 times, 32 papers at international conferences and co-author of two books. He was mastering seven PhDs and five scientific master's theses.

Friday, September 24, 16:00-17:30 (BURA)

iPANEL: Summer Camp Innovation Challenge

“Every once in a while, a new technology, an old problem, and a big idea turn into an innovation.” — Dean Kamen

The basis of every innovation is a deep understanding of a problem domain, differentiation between customer needs and wants, and finally knowledge in the solution space. Rapid advances in ICT in last few decades expand the solution space and its application to almost any problem domain. However, packaging those solutions to a product or a service that will fulfil customer needs is still a challenge faced by numerous companies. That said, having a solution or a technology does not imply having a product as well.

With this innovation challenge, SoftCOM conference gives an opportunity to student participants of this years Ericsson Nikola Tesla Summer Camp to turn their project outcomes and findings into an innovative idea and win a valuable prize. Only several ideas will be selected and pushed to the finals, where the authors will have to present their ideas at this iPanel in front of their colleagues and experts. Their ideas will be voted on, where students with the best ideas will be given valuable prizes.

1st Place: GOLD iAward certificate – Wireless around-ear headphones

2nd Place: SILVER iAward certificate – External SSD USB 3.1

3rd Place: BRONZE iAward certificate – Wearable Activity Tracker

Moderator:

Toni Mastelic, Ericsson Nikola Tesla d.d., Split



Toni Mastelic is a researcher at Ericsson Nikola Tesla d.d., Research department. He did his bachelor and masters studies in Computer Science at the University of Split, FESB, Croatia, where he received his Bachelor degree in 2009, and Master degree in 2011. Afterwards, he worked as aresearch and later on as university assistant at Vienna University of Technology, where he pursued his PhD. Finally, he received his PhD degree in 2015 at the Institute of Software Technology and Interactive Systems, Vienna University of Technology.

Friday, September 24, 09:00-10:30 (BURA)

WSEP: 10TH WORKSHOP ON SOFTWARE ENGINEERING IN PRACTICE

The software is everywhere around us. The significant growth of ICT products and solutions depends on the quality of the used software. The software is essential enabler of future usage and growth of networked society surrounded with connected devices. Are we ready for such mass software production and keeping the software product life cycle continuous? How are the current researches and used software engineering practice correlated and ready to take responsibility for such broad and demanding software usage with quality, security and energy efficiency demands? What are the software products in the “software-as-a-service” era? Are we aware of software architecture demands and software life-cycle management? What challenges in software engineering are the most critical? Let's take opportunity to discuss these software engineering challenges and exchange experience between researchers and practitioners. Prepare your view and share it with others. Be on the workshop during the SoftCOM 2021 conference.

MODERATOR: Darko Huljenic, PhD, Ericsson Nikola Tesla d.d., Zagreb



Biography:

Dr. Darko Huljenic received his Ph.D. degrees from the University of Zagreb, Croatia, in 2001. He has been with Ericsson Nikola Tesla since 1984. His current position is Director of Research Unit. He expanded company research cooperation with the major Croatian Universities as well as some international research institution's. His main interests are open network architecture, software development methodologies and service oriented architecture. Dr. Huljenic holds a position of associate professor at the University of Zagreb, at the Faculty of Electrical Engineering and Computing.

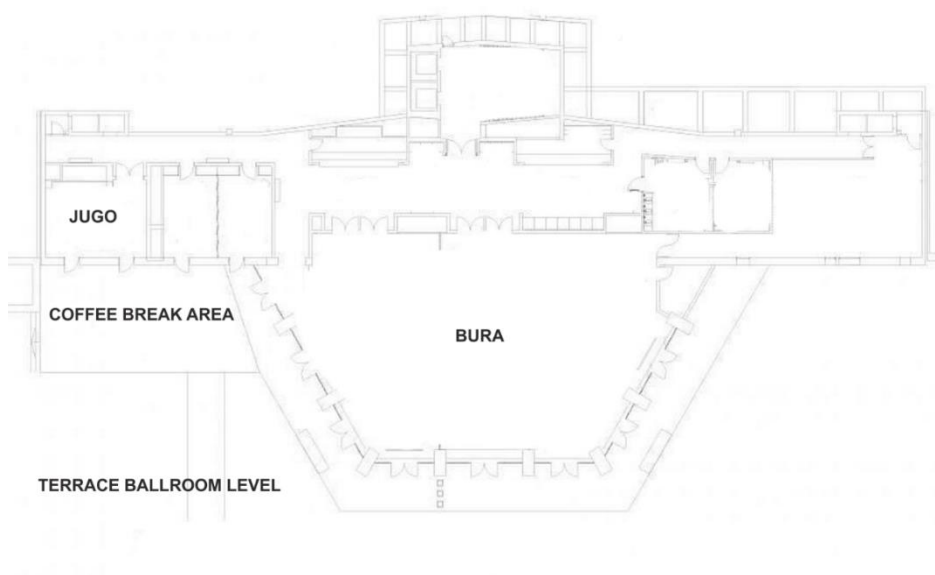
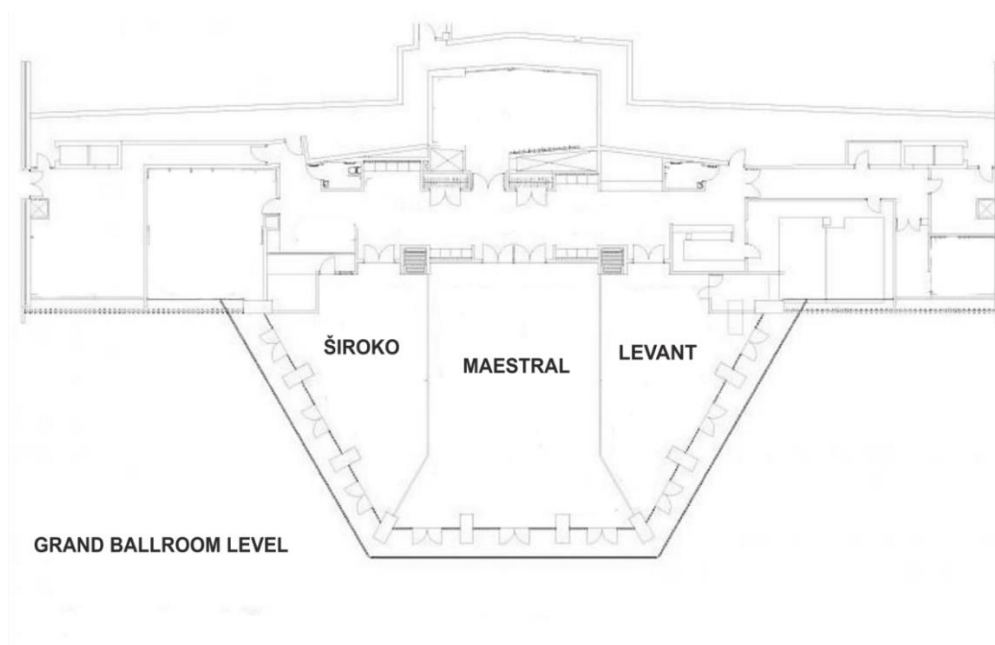
Comparing Open Source and Proprietary Database Solutions for Querying Spatio-Temporal Data: SpaceTime vs Geomesa

Dinko Zidic and Toni Mastelic (Ericsson Nikola Tesla, Croatia)

Porting Console Applications to Micorservices: xTide use case

Domagoj Bazina (PMF, University of Split, Croatia); Toni Mastelic (Ericsson Nikola Tesla, Croatia)

FLOOR PLAN OF HOTEL AMFORA AND GENERAL INFORMATION



ABOUT

The 29th International Conference on Software, Tele-communications and Computer Networks (SoftCOM 2021) will be held in hybrid format (live and virtual) on September 23-25 on Hvar, Croatia.

ELECTRONIC PROCEEDINGS

Electronic Proceedings, USB Proceedings and Final Program will be available at conference website.

LANGUAGE

The Conference language is English.

SECRETARY

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