SoftCOM 2020 - CONTENTS

GENERAL CO-CHAIRS MESSAGE

Welcome Message

Dear participants and colleagues, it is our pleasure to welcome you to SoftCOM 2020 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. We are together building a society where every person and every industry is empowered to reach their full potential. 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.

The 28th International Conference on Software, Telecommunications and Computer Networks (SoftCOM 2020), co-sponsored by the IEEE Communications Society, will be held online, due to the COVID-19 pandemic. This year it is our pleasure to invite you virtually to the beautiful city of Split located on the magnificent Croatian Adriatic coast.

Welcome!

Sinisa Krajnovic, Ericsson AB

Dinko Begusic, University of Split

TEHNICAL PROGRAM CHAIRS MESSAGE

The 28th Conference on Software, Telecommunications and Computer Networks (SoftCOM 2020) will be held as a virtual conference, September 17 to 19, 2020.

Researchers and experts from industry, research institutes and universities from 30 countries all around the world have submitted their submissions for presentation at SoftCOM 2020. Submitted papers have been reviewed by more than 250 scientists from universities, institutes and ICT companies. 100 accepted papers have been carefully selected based on their contribution, relevance, conceptual clearness and overall quality. Thus 48% of submitted papers have been recommended for presentation within the technical program.

The technical conference program features ten general conference sessions, one symposium, and eight special sessions. The symposium has been dedicated to Robotic and ICT Assisted Wellbeing.

The special sessions are dedicated to hot topics including: QoS in Wired and Wireless Networks, Ad Hoc and Sensor Networks, Green Networking and Computing, Service Quality, Reliability and Security, Security and Digital Forensics, Advances in Machine Learning for Business and Finance, 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 9th Workshop on Software Engineering in Practice has been organized by the research group from Ericsson Nikola Tesla company. The PhD Forum and the SoftCOM Innovations workshop provide the opportunity to young researchers to promote their research 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 2020 COMMITTEES

TECHNICAL PROGRAM COMMITTEE

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

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SoftCOM 2020 Conference Secretary
Katarina Radoš, University of Split, softcom@fesb.hr

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

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SoftCOM 2020 PROGRAM OUTLINE

Thursday, September 17, 2020 (virtual)

09.00 - 10.30 Technical program, Professional program, Business forum

10.30 - 11.00 Coffee break

11.00 - 12.30 Technical program, Professional program, Business forum

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

Friday, September 18, 2020 (virtual)

09.00 - 10.30 Technical program, Professional program, Business forum

10.30 - 11.00 Coffee break

11.00 - 12:30 Opening ceremony, Keynote speech

14.30 - 16.00 Technical program, Professional program, Business forum

Saturday, September 19, 2020 (virtual)

08.30 – 10.00 Technical program, Professional program, Business forum

10.00 - 10.30 Coffee break

10.30 - 12.00 Technical program, Professional program, Business forum

KEYNOTE / INVITED SPEAKERS

Sinisa Krajnovic, PhD

Executive Vice President and Head of Digital Services, Market Area North East Asia at Ericsson

5G: New Engine of Digital Economic Growth

Sinisa Krajnovic is Executive Vice President and Head of Digital Services in Market Area North East Asia at Ericsson. He is responsible for Ericsson Digital Services business in Mainland China, Hong Kong, Macau, Taiwan, Japan, and South Korea. Business Area Digital Services offers products, services, and end-to-end solutions to communication service providers and enterprises in areas such as 5G Core Networks, OSS/BSS, Cloud Infrastructure, IoT, and Digital Transformation. Since 2018 he lives and works in Beijing, China. Krajnovic is an experienced Board Member, including both Chairman of the Board role and Board Director role, on various Ericsson local companies and joint ventures boards, as well as on chamber of commerce and business school boards. Previously, Krajnovic served as Vice President and Head of Development Unit Networks in Ericsson, living and working in Stockholm, Sweden. He led more than 15,000 engineers in the global R&D organization that focuses on technology leadership of Ericsson's hardware and software Radio Access Network products. Sinisa Krajnovic has a long and varied international management background in telecoms, as well as an extensive multicultural experience gained from living and working in Croatia, UK, Ireland, Japan, Hungary, Sweden, and China. Krajnovic is active in the academic world. He is Professor at the Zagreb School of Economics and Management in Croatia, and Program Director of the school's General MBA Program. He is Professor at the Luxembourg School of Business in Luxembourg, and a member of its Advisory Council. Krajnovic is also Visiting Professor at the Tsinghua University School of Economics and Management in China. He was co-founder and first president of the Croatian branch of the Project Management Institute, the leading global project management association. Sinisa Krajnovic earned MSc and PhD degrees from the Faculty of Electrical Engineering and Computing at the University of Zagreb, Croatia. He completed several executive development programs, at Columbia University in the US, Cranfield University in the UK, University of Zagreb in Croatia, IMD Business School in Switzerland, and Indian School of Business in India.

Nino Antulov-Fantulin, PhD

ETH Zurich, Switzerland

Machine Learning and Cryptocurrency Markets

In this talk, we present the research around "Cryptocurrency and blockchain systems". In particular, we analyse, three different sources of data originating from (i) blockchains, (ii) exchange office, and (iii) news data. In the first part, we study the possibility of inferring early warning indicators for periods of extreme bitcoin price volatility using features obtained from the Bitcoin daily transaction graphs. In the second part, we show the temporal mixture models capable of adaptively exploiting both volatility history and order book features. Our temporal mixture model enables to decipher time-varying effect of order book features on the volatility. In the last part, we focus on cryptocurrency news. In order to track popular news in real-time, we (a) match news from the web with tweets from social media,(b) track their intraday tweet activity and (c) explore different machine learning models for predicting the number of article mentions on Twitter after its publication.

Nino Antulov-Fantulin is a senior researcher at ETH Zurich, COSS group and visiting research associate at Courant Institute of Mathematical Sciences, NYU. He works at the interface of complexity and data science. His main interests include dynamical processes on networks, predictive analytics for FinTech (cryptocurrency & blockchain markets), machine learning, social network analysis and Monte-Carlo algorithms. He is a co-founder and head of research at Aisot GmbH Zurich, which delivers real-time (crypto)financial predictive analytics signals. Prior to ETH Zurich, he worked at the Rudjer Boskovic Institute and Faculty of Electrical Engineering and Computing, Croatia and he was a visiting scientist at Robert Koch Institute, Berlin. He also works as Supervisor & Panel member of PhD Program in Data Science, Scuola Normale Superiore, Pisa. He worked on several EU projects: SoBigData — "Social Mining & Big Data Ecosystems", Multiplex —

INVITED SPEAKER IS2   Thursday, September 17,

                                                          11:00 - 11:30 (PALMA I)

Darko Zibar, PhD
DTU Fotonik, Technical University of Denmark, Denmark

Advancing optical communication and measurement systems using machine learning

According to the recent data traffic predictions, current optical communication systems, operating in the C--band only, will not be able to satisfy future data rate demands. A viable and long--term solution would be to employ systems operating in multiple bands (O+E+S+C+L) and make usage of the spatial division multiplexing (SDM) (multi--core and multi--mode). Designing optimal signaling, amplification and detection schemes, for such systems, will be challenging due to the high system complexity. Finally, performing system optimization in terms of channel power and bandwidth allocation, as well as modulation format selection, will become difficult using standard tools that rely on analytical or semi--analytical models. What will complicate the matter even further is the focus on providing a secure way of transmitting information using quantum communication. This will require a coexistence and management of classical and quantum channels in the same optical network. As quantum signals have in general significantly, lower powers compared to the signals in classical communication, the reception of quantum signals is more challenging, making a strong case for having intelligent optical receivers that can receive and even distinguish between classical and quantum signals. The field of machine learning (ML) can provide useful tools to address the aforementioned challenges. This is because ML techniques excel at: 1) learning highly--complex input--output mappings which allows for system optimization, 2) learning signaling and detection schemes for complex channels or for channels where analytical models are not available and 3) performing ultra--sensitive signal detection. In this talk, it will be shown how machine learning can enable design of ultrawide-band optical amplifiers, perform constellation shaping over the nonlinear fibre optic channel and enable ultra-sensitive measurements of optical phase that approach the quantum limit.

Darko Zibar is Associate Professor at the Department of Photonics Engineering, Technical University of Denmark and the group leader of Machine Learning in Photonics Systems (M-LiPS) group. He received M.Sc. degree in telecommunication and the Ph.D. degree in optical communications from the Technical University of Denmark, in 2004 and 2007, respectively. He has been on several occasions (2006, 2008 and 2019) visiting researcher with the Optoelectronic Research Group led by Prof. John E. Bowers at the University of California, Santa Barbara, (UCSB). At UCSB, he has been working on topics ranging from analog and digital demodulation techniques for microwave photonic links, coherent detection to machine learning enabled ultra-sensitive laser phase noise measurements techniques. In 2009, he was a visiting researcher with Nokia-Siemens Networks, working on clock recovery techniques for 112 Gb/s polarization multiplexed optical communication systems. In 2018, he was visiting Professor with Optical Communication (Prof. Andrea Carena, OptCom) group, Dipartimento di Elettronica e Telecomunicazioni, Politecnico di Torino working on the topic of machine learning based Raman amplifier design. His resreach efforts are currently focused on the application of machine learning technqiues to advance classical and quantum optical communication and measurement systems. Some of his major scientific contributions include: record-capacity hybrid optical-wireless link (2011), record-sensitive optical phase noise measurement technique that approaches the quantum limit (2019) and demonstration of first ultra-wide band programmable gain Raman amplifier (2019). He is a recipient of Best Student paper award at Microwave Photonics Conference (2006), Villum Young Investigator Programme (2012), Young Researcher Award by University of Erlangen-Nurnberg (2016) and European Research Council (ERC) Consolidator Grant (2017). Finally, he was a part of the team that won the HORIZON 2020 prize for breaking the optical transmission barriers (2016).

TECHNICAL PROGRAM: GENERAL CONFERENCE

Thursday, September 17, 09:00 - 10:30 (OLEANDAR)

S1/I: MACHINE LEARNING APPLICATIONS I

Chair: Mario Kusek, University of Zagreb, Croatia

Machine Learning Based Task Distribution in Heterogeneous Fog-Cloud Environments
Mohammadreza Pourkiani (University of Rostock, Germany); Masoud Abedi (Thünen-Institut of Baltic Sea Fisheries, Germany)

Context-based system for User-Centric Smart Environment
Katarina Mandarić and Pavle Skocir (University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia); Gordan Jezic (University of Zagreb, Croatia)

Soft Network Organisation Towards Future Distributed ML-based Sensing Systems
Krzysztof Cichoń (Poznan University of Technology, Poland)

Neural networks for image recognition in mobile applications
Aneta Poniszewska-Maranda (Lodz University of Technology, Poland)

Machine learning methods for Internet of Things in medical diagnosis
Aneta Poniszewska-Maranda, Joanna Pawelska and Tomasz Krym (Lodz University of Technology, Poland)

Thursday, September 17, 11:00 - 12:30 (OLEANDAR)

S1/II: MACHINE LEARNING APPLICATIONS II

Chair: Pavle Skocir, University of Zagreb, Croatia

Improved Whale Optimization Algorithm for SVM Model Selection: Application in Medical Diagnosis
Sofiane Kharbech (University of Lille, France); Akram Belazi (ENIT, Tunisia); Sarra Ben Chaabane (Tunis El Manar University, Tunisia); Ammar Bouallegue (National School of Engineers of Tunis, Tunisia)sity of Technology, Poland)

A Fast and Robust, Forehead-Augmented 3D Face Reconstruction from Multiple Images using Geometrical Methods
Alexandru I. Marinescu (Babes Bolyai University, Romania); Adrian Sergiu Darabant (Babes Bolyai University & Cluj Napoca, Romania); Tudor Alexandru Ileni (Babes Bolyai University, Romania)

Comparison of Q-Learning based Traffic Light Control Methods and Objective Functions
Péter Pálos and Árpád Huszák (Budapest University of Technology and Economics, Hungary)

A new language independent strategy for clickbait detection
Claudia Ioana Coste and Darius Bufnea (Babeș-Bolyai University, Romania); Virginia Niculescu (Babes-Bolyai University of Cluj-Napoca, Romania)

Detecting leaf plant diseases using deep learning: A review
Horea-Bogdan Muresan (Babes-Bolyai University, Romania); Adriana M Coroiu (BABES-BOLYAI University, Romania); Alina Calin (Babeș-Bolyai University, Romania)

A musical similarity metric based on symbolic aggregate approximation
Alexandru I. Marinescu (Babes Bolyai University, Romania)

Thursday, September 17, 14:00 - 15:30 (OLEANDAR)

S2: SIGNAL PROCESSING AND CODING

Chair: Joško Radić (University of Split, Croatia)

Low Complexity Bounds on a Class of Irregular LDPC Belief-Propagation Decoding Thresholds
Francesca Vatta, Alessandro Soranzo, Massimiliano Comisso, Giulia Buttazzoni and Fulvio Babich (University of Trieste, Italy)

A Low Inertia Guided Auto-Encoder for Anomaly Detection in Networks
Yves Nguimbous Nsoga (Higher School of Communications of Tunis & Digital Security Research Laboratory, Tunisia); Riadh Ksantini (University of Windsor, Canada); Adel Bouhoula (Higher School of Communications of Tunis, Tunisia)

The Black-White Pixels Ratio in Medial Temporal Lobe Brain Structure in Transcranial B-Images as a Measurable Marker of Alzheimer's Disease Probability: The Reproducibility Overview
Jiri Blahuta (Moravian Business College Olomouc), Tomas Soukup (Silesian University in Opava & Moravian Business College Olomouc), Lukas Pavlik (Moravian Business College Olomouc)

Removal of unwanted objects from still photographs
Rosana Balanescu, Adrian Sterca and Ioan Badarinza (Babes-Bolyai University, Romania)

Evaluation of Generative Adversarial Network for Human Face Image Synthesis
Ivana Marin (University of Split, Croatia); Sven Gotovac (University of Split & FESB, Croatia); Mladen Russo (University of Split, Croatia)

Thursday, September 17, 14:00 - 15:30 (RUŽMARIN)

S3: 5G TECHNOLOGIES

Chair: Åke Arvidsson (Kristianstad University, Sweden)

Towards intelligent Industry 4.0 5G networks: A first throughput and QoE measurement campaign
William Tärneberg (Lund University, Sweden); Omar Hamsis and John Hedlund (RISE Research Intstitutes of Sweden AB, Sweden); Kjell Brunnström (RISE Research Institutes of Sweden AB & Mid Sweden University, Sweden); Emma Fitzgerald (Lund University, Sweden & Warsaw University of Technology, Poland); Andreas Johnsson and Viktor Berggren (Ericsson Research, Sweden); Maria Kihl (Lund University, Sweden); Akhila Rao and Rebecca Steinert (RISE Research

Institutes of Sweden, Sweden); Caner Kilinc (Ericsson Research, Sweden)

Genetic Algorithm for Inter-Slice Resource Management in 5G network with Isolation
Xu Yang, Yue Liu, Ieok Cheng Wong, Yapeng Wang and Laurie Cuthbert (Macao Polytechnic Institute, Macao)

Shannon Capacity Evaluation for 5G Communications Using the 3D Random Waypoint Mobility Model
Massimiliano Comisso, Francesca Vatta, Giulia Buttazzoni and Fulvio Babich (University of Trieste, Italy)

Analysis of 5G outdoor and indoor coexistence scenarios for spectrum sharing with Active Antenna System
Valeria Petrini (Fondazione Ugo Bordoni, Italy); Claudia Carciofi (FUB, Italy); Paolo Grazioso and Manuel Faccioli (Fondazione Ugo Bordoni, Italy)

Circular Dipole Array With Omnidirectional and Beamsteering Capabilities for 5G Communications
Saber Dakhli and Ameni Cherif (Innov'Com Laboratory, SUPCOM, University of Carthage Tunis, Tunisia); Jean-marie Floch (IETR-INSA Rennes, France); F. Choubani (SUP'COM, Tunisia)

A Stacked Patch Antenna with Periodic EBG Structure And Switching-beam Capability for 5G Applications
Ilhem Gharbi (University of Carthage, Tunisia); Rim Barrak (Higher School of Communications of Tunis, Tunisia); Jean Marc Ribero (Université Côte d'Azur & CNRS, LEAT, France); Ragad Hedi (Unit of Research in High Frequency Electronic Circuits and Systems, France); Mourad Menif (GRESCOM Laboratory, University of Carthage, Tunisia)

Thursday, September 17, 09:00 - 10:30 (RUŽMARIN)
S4/I: WIRELESS COMMUNICATIONS I

Chair: Tomaz Javornik (Jozef Stefan Institute, Slovenia)

Massive MIMO Pilot Scheduling over Cloud RAN for Industry 4.0
Haorui Peng and William Tärneberg (Lund University, Sweden); Emma Fitzgerald (Lund University, Sweden & Warsaw University of Technology, Poland); Maria Kihl (Lund University, Sweden)

Power Amplifier Nonlinearities Effects on Massive MIMO Uplink Channel Estimation
Noura Lahbib, Maha Cherif, Moez Hizem and Ridha Bouallegue (Carthage University, Sup'Com, Innov'Com, Tunisia)

The NDIC Algorithm of HPA Nonlinearity on MU-Massive MIMO System Performance
Maha Cherif and Ridha Bouallegue (Innov'Com Lab, Tunisia)

Weighted Kalman Based Detection for Uplink MIMO Systems
Wafa Abid (National Engineering School of Tunis & Innov'COM Laboratory ,Supcom, Tunisia); Moufida Hajjaj (SUP'COM, Tunisia); Ameni Mejri (National Engineering School of Tunis & SYS'COM Laboratory, Tunisia); Ridha R. Bouallegue, B. (Ecole Supérieure des Communications de Tunis, Tunisia)

Moments of Signals over Wireless Relay Fading Environment with Line-of-Sight
Dragana Krstić (Faculty of Electronic Engineering, University of Niš, Serbia); Petar Nikolić (Tigar Tyres, Pirot, Serbia); Zoran Popovic (Technical College of Vocational Studies, Zvecan, Serbia); Sinisa Minić (Teachers College in Prizren - Leposavic, Serbia); Mihajlo Stefanović (University of Nis, Serbia)

Simplified and Reliable Wireless Data Transmission in Ultra Dense Networks
Łukasz Kułacz and Adrian Kliks (Poznan University of Technology, Poland)

Thursday, September 17, 11:00 - 12:30 (RUŽMARIN)
S4/II: WIRELESS COMMUNICATIONS II

Chair: Zoran Blažević (University of Split, Croatia)

Bonded Wireless Networks: the Gateway to Real-Time Mobile Applications
Marcin Brzozowski (IHP, Germany); Peter Langendoerfer (IHP Microelectronics, Germany)

Coexistence of IEEE 802.11p and the TDMA-based AS-DTMAC Protocol
Fouzi Boukhalfa and Mohamed Hadded (VEDECOM, France); Paul Muhlethaler (INRIA, France); Oyunchimeg Shagdar (VEDECOM, France)

Scaling up routing in nanonetworks with asynchronous node sleeping
Ali Medlej (FEMTO-ST Institute, Universite Bourgogne Franche-Comt´e, Montb´eliard & Lebanese University, Faculty of Computer Science, Lebanon); Kamal Beydoun (Lebanese University & Faculty of Sciences I, Lebanon); Eugen Dedu and Dominique Dhoutaut (FEMTO-ST Institute, Univ Bourgogne Franche-Comté, CNRS, France)

Characterisation of Unsolicited Traffic Advertisements in Mobile Devices
José Pedro Veiga Silva, Paulo Carvalho and Solange Rito Lima (Centro Algoritmi, Universidade do Minho, Portugal)

HiPerConTracer - A Versatile Tool for IP Connectivity Tracing in Multi-Path Setups
Thomas Dreibholz (Simula Metropolitan Centre for Digital Engineering, Norway)

Mixing of commercially available 3D printing filaments for novel RF components
Jan Köhler and Wolfgang Bosch (Graz University of Technology & Institute of Microwave and Photonic Engineering, Austria); Erich Leitgeb and Reinhard Teschl (Graz University of Technology, Austria); David Pommerenke (TU Graz, Austria)

Thursday, September 17, 11:00 - 12:30 (PALMA I)
S5: OPTICAL COMMUNICATIONS

Chair: Darko Zibar (DTU Fotonik, Technical University of Denmark, Denmark)

Quality of Service in ASON/GMPLS Network with Hierarchical Control Plane Structure
Sylwester Kaczmarek (Gdansk University of Technology & Faculty ETI, Poland); Magdalena Młynarczuk (Gdańsk University of Technology & Politechnika Gdańska, Poland)

Evaluation of Intensity Modulated WDM FOTS with Interleaved RS-FEC Code Schemes
Svitlana Matsenko, Sandis Spolitis and Vjaceslavs Bobrovs (Riga Technical University, Latvia)

"Banda Calculus": a Tool for Bandwidth Estimation in Broadband Network Infrastructures
Gian Paolo Jesi (Lepida ScpA, Italy); Gianluca Mazzini (LepidaSpA & UniFe, Italy)

Thursday, September 17, 16:00 - 17:30 (RUŽMARIN)

S6: SOFTWARE DEVELOPMENT METHODS

Chair: Linda Vicković (University of Split, Croatia)

DevOps for AI - Challenges in Development of AI based Applications
Lucy Ellen Lwakatare, Ivica Crnkovic and Jan Bosch (Chalmers University of Technology, Sweden)

Software Implementation of Error Detection and Correction Against Single-Event Upsets
Eugenio Baviera, Giovanni Schettino, Emanuele Tuniz and Francesca Vatta (University of Trieste, Italy)

Recommendations for enhancing security in Microservice environment altered in an intelligent way
Tihomir Tenev (Faculty of Mathematics and Informatics, Bulgaria); Simeon Tsvetanov (Sofia University, Bulgaria)

Comparative Case Study of Plan-Driven and Agile Approaches in Student Computing Projects
Rafał Włodarski and Aneta Poniszewska-Maranda (Lodz University of Technology, Poland)

A NLP approach to estimating effort in a work environment
Dan A Iftinca and Catalin Rusu (Babes Bolyiai University, Romania); Oliver Oswald (MHP, Romania)

Thursday, September 17, 16:00 - 17:30 (OLEANDAR)

S7: VEHICULAR NETWORKS

Chair: Dario Pevec, University of Zagreb, Croatia

Vehicular Networking: ITS-G5 vs 5G Performance Evaluation using Road Weather Information
Muhammad Naeem Tahir (Finnish Meteorological Institute (FMI) & University of Oulu, Center of Wireless Communication, Finland); Timo Sukuvaara (Finnish Meteorological Institute, Finland); Marcos Katz (University of Oulu, Finland)

Survey and Evaluation of Internet of Vehicles Connectivity Challenges
Victor Farias Borges, Danilo F S Santos and Angelo Perkusich (Federal University of Campina Grande, Brazil); Krzysztof Mateusz Malarski (Technical University of Denmark, Denmark)

Centralized Coordination of Autonomous Vehicles at Intersections

SeyedeZahra Chamideh, William Tärneberg and Maria Kihl (Lund University, Sweden)

Smart Contract-Based Access Control for the Vehicular Networks
Amira Kchaou (University Carthage, Tunisia); Samiha Ayed (Université Technologique de Troyes, France); Ryma Abassi (School of Communication Engineering, Sup' Com, Tunisia); Sihem Guemara El Fatmi (University of Cathage, Tunisia)

Saturday, September 19, 10:30 - 12:00 (OLEANDAR)

P1: POSTERS / ABSTRACTS SESSION

Chair: Matko Šarić (University of Split, Croatia)

A 4G/5G Packet Core as VNF with Open Source MANO and OpenAirInterface
Thomas Dreibholz (Simula Metropolitan Centre for Digital Engineering, Norway)

Pedestrian Motion Detection & Pedestrian Communication (P2I &V2P)
Muhammad Naeem Tahir (Finnish Meteorological Institute (FMI) & University of Oulu, Center of Wireless Communication, Finland); Kari Mäenpää (Finnish Meteorological Institute, Finland); Marjo Hippi (Research Scientist, Finland)

OFDM Multi-Numerology for Future 5G New Radio Communication Systems
Gordana Raluca Barb (Politehnica University of Timisoara, Romania); Marius Otesteanu (Universitatea Politehnica Timisoara, Romania); Florin Alexa (Politehnica University Timisoara, Romania); Flavius Danuti (Politehnica University of Timisoara, Romania)

Assessment of SAR using Simplified Body Representation due to RFiD Field Exposure
Enida Cero Dinarević (FESB, Bosnia and Herzegovina); Dragan Poljak and Zoran Blažević (University of Split, Croatia)

Genetic algorithm parametrization for informed exploration of short peptides chemical space
Erik Otović, Marko Njirjak and Ivana Žužić (University of Rijeka, Faculty of Engineering, Croatia); Daniela Kalafatovic (University of Rijeka & University of Rijeka, Center for Artificial Intelligence and Cybersecurity, Croatia); Goran Mausa (University of Rijeka, Faculty of Engineering & University of Rijeka, Center for Artificial Intelligence and Cybersecurity, Croatia)

SPECIAL SESSIONS AND SYMPOSIA

SS1: SPECIAL SESSION ON QoS IN WIRED AND WIRELESS NETWORKS

Friday, September 18, 09:00 - 10:30 (OLEANDAR)
SS1: Special Session on QoS in Wired and Wireless Networks

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

Analytical SINR for D2D communication underlay 5G Networks
Sawsan Selmi (University Tunis El Manar & Tunisia, Tunisia); Ridha Bouallegue (Innov'COM @ Sup'Com., Tunisia)

Joint Spectral and Energy Efficient Multi-hop D2D Communication Underlay 5G Networks
Sawsan Selmi (University Tunis El Manar & Tunisia, Tunisia); Ridha Bouallegue (Innov'COM @ Sup'Com., Tunisia)

MAC-aware Routing Protocols for Vehicular Ad Hoc Networks: A Survey
Abir Rebei (Faculty of Science of Gabes, Tunisia); Mohamed Hadded (VEDECOM, France); Haifa Touati (Faculty of Sciences of Gabes & Hatem Bettahar IResCoMath Research Unit, Tunisia); Fouzi Boukhalfa (VEDECOM, France); Paul Muhlethaler (INRIA, France)

Mobility Support for Energy and QoS aware IoT Services placement in the Fog

Tanissia Djemai (LAAS-CNRS, France); Stolf Patricia (IRIT Universite Paul Sabatier UTM IUT de Blagnac, France); Thierry Monteil (LAAS-CNRS, University of Toulouse, France); Jean-Marc Pierson (Univerty Paul Sabatier, Toulouse, France)

IP Multihoming Throughput Maximization based on Passive RTT Measurements
Adrian Sterca (Babes-Bolyai University, Romania); Darius Bufnea (Babeș-Bolyai University, Romania); Virginia Niculescu (Babes-Bolyai University of Cluj-Napoca, Romania)

Friday, September 18, 09:00 - 10:30 (RUŽMARIN)
SS2: Special Session on Advanced Educational Technologies

Chair: Ani Grubišić (University of Split, Croatia)

Factual Knowledge Acquisition and Remembering Using Digital Flashcard Tool
Matea Markić Vučić (SPARK School, Bosnia and Herzegovina); Suzana Tomaš (University of Split, Faculty of Humanities and Social Sciences, Croatia); Slavomir Stankov (University of Split, Croatia)

Learning, Teaching, and Making Music Together in the COVID-19 Era Through IEEE 1599
Adriano Baratè and Luca Andrea Ludovico (Università degli Studi di Milano, Italy); Goffredo Haus (University of Milan, Italy)

Syntax-aware Neural Semantic Role Labeling for Morphologically Rich Languages
Daniel Vasić (University of Mostar & Faculty of Science Math and Education, Bosnia and Herzegovina); Mirela Kundid Vasić (University of Mostar & Faculty of Mechanical Engeneering and Computing, Bosnia and Herzegovina)

Coding training proposal for kindergarten
Elisa Benetti (LepidaScpA, Italy); Gianluca Mazzini (LepidaSpA & UniFe, Italy)

Friday, September 18, 14:30 - 16:00 (OLEANDAR)

SS3: Special Session on Service Quality, Reliability and Security

Chair: Janusz Henryk Klink (Wroclaw University of Science and Technology, Poland)

Intrusion Detection in Digital Twins for Industrial Control Systems
Fatemeh Akbarian (Lund University, Sweden); Emma Fitzgerald (Lund University, Sweden & Warsaw University of Technology, Poland); Maria Kihl (Lund University, Sweden)

Distributed analysis tool for vulnerability prioritization in corporate networks
Michał Walkowski (Wroclaw University of Science and Technology, Poland); Maciej Krakowiak (DSecure, Poland); Jacek Oko and Sławomir Sujecki (Wroclaw University of Science and Technology, Poland)

Efficient and Private OpenPGP Certificate Updates
Tobias Mueller (Uni Hamburg, Germany)

Modern Codecs by Video Streaming under Use DASH Technique: An Objective Comparison Study
Tadeus Uhl (Maritime University of Szczecin/Poland, Poland); Christian Hoppe (Nextragen Solutions GmbH, Germany); Janusz Henryk Klink (Wroclaw University of Science and Technology, Poland)

Video Quality Assessment: some remarks on selected objective metrics
Janusz Henryk Klink (Wroclaw University of Science and Technology, Poland); Tadeus Uhl (Maritime University of Szczecin/Poland, Poland)

Friday, September 18, 09:00 - 10:30 (PALMA I)
SS4: Special Session on Security and Digital Forensics

Chair: Toni Perković (University of Split, Croatia)

Towards Creation of Automated Prediction Systems for Trust and Dependability Evaluation of CPSoS
Emilia Cioroaica and Thomas Kuhn (Fraunhofer IESE, Germany); Stanislav Chren (Faculty of Informatics, Masaryk University, Brno, Czech Republic); Oum-El-Kheir Aktouf (Grenoble INP - LCIS, France); Alf Larsson (Ericsson, Sweden); Ram Chillarege (Chillarege Inc., USA); Daniel Schneider (Fraunhofer Institute, Germany); Christian Wolschke (Fraunhofer IESE, Germany)

Behavior-based Anomaly Detection for Securing Smart Home Systems Automation
Noureddine Amraoui (Faculty of Sciences of Tunis, Tunisia); Belhassen Zouari (University of Carthage, Tunisia)

The DAO Induction Attack Against the RPL-based Internet of Things
Ahmad Shabani Baghani, Sonbol Rahimpour and Majid Khabbazian (University of Alberta, Canada)

On Recent Security Issues in Machine Learning
Mohammed M. Alani (United Arab Emirates)

A Game Theoretic Approach For Deploying Forensic Ready Systems
Yosra Lakhdhar (Communication Networks and Security Research Lab., University of Carthage, Tunisia); Slim Rekhis (University of Carthage & Communication Networks and Security Research Lab., Tunisia); Essaid Sabir (ENSEM, Hassan II University of Casablanca, Morocco)

Iris and Foot based Sustainable Biometric Identification Approach
Shahzad Ashraf (Hohai University Changzhou Jiangsu, China); Sehrish Saleem (Muhammad Nawaz Sharif University of Engineering & Technology Multan, Pakistan); Tauqeer Ahmed (Hohai University Changzhou Jiangsu, China); Zeeshan Aslam (Petroweld Kurdistan Erbil, Iraq); Muhammad Shuaeeb (Dow University of Health Sciences, Karachi, Pakistan)

Performance Impact Analysis of Security Attacks on Cross-Layer Routing Protocols in Vehicular Ad hoc Networks
Sihem Baccari (Faculty of Science of Gabes, Tunisia); Haifa Touati (Faculty of Sciences of Gabes & Hatem Bettahar IResCoMath Research Unit, Tunisia); Mohamed Hadded (VEDECOM, France); Paul Muhlethaler (INRIA, France)

SS5: SPECIAL SESSION ON ENVIRONMENTAL ELECTROMAGNETIC COMPATIBILITY (EEMC)

Friday, September 18, 14:30 – 16:00 (RUŽMARIN)
SS5: Special Session on Environmental Electromagnetic Compatibility (EEMC)

Co-chairs: Dragan Poljak and Vesna Roje (University of Split, Croatia)

Assessment of SAR in a Simplified Body Model due to Hertz Dipole Exposure
Anna Susnjara and Dragan Poljak (University of Split, Croatia)

Assessment of Transmitted Power Density due to Hertz Dipole Radiation using the Modified Image Theory Approach
Dragan Poljak (University of Split, Croatia); Vicko Doric (University of Split, FESB, Croatia)

Numerical Solution of the Schrödinger Equation Using a Neural Network Approach
Ante Lojić Kapetanović and Dragan Poljak (University of Split, Croatia)

Frequency Reconfigurable Multiband Planar Antenna For Multistandard Communications
Saber Dakhli (Innov'Com Laboratory, SUPCOM, University of Carthage Tunis, Tunisia); Moheddine Smari (Innov'Com Laboratory, Supcom, University of Carthage, Tunisia); Jean-marie Floch (IETR-INSA Rennes, France); F. Choubani (SUP'COM, Tunisia)

Compact and Frequency-Reconfigurable Printed Antenna for Heterogeneous Wireless Systems
Saber Dakhli (Innov'Com Laboratory, SUPCOM, University of Carthage Tunis, Tunisia); Moheddine Smari (Innov'Com Laboratory, Supcom, University of Carthage, Tunisia); Jean-marie Floch (IETR-INSA Rennes, France); F. Choubani (SUP'COM, Tunisia)

SS6: SPECIAL SESSION ON AD HOC&SENSOR NETWORKS AND INTERNET OF THINGS

Friday, September 18, 14:30 - 16:00 (PALMA I)
SS6: Special Session on Ad Hoc&Sensor Networks and Internet of Things

Chair: Petar Šolić (University of Split, Croatia)

Integrating an IoT Application Middleware with a Fog and Edge Computing Simulator
Fernanda Famá, Danilo F S Santos and Angelo Perkusich (Federal University of Campina Grande, Brazil)

Optimal Time Slot Allocation for Communicating Things Using Local Clocks
Michael Mahamat (Université de Technologie de Compiègne, France); Hicham Lakhlef (Heudiasyc, University of Technology of Compiègne, France); Ahmed Lounis (University de Technology de Compiègne, France); Imine Youcef (University de Technologie de Compiègne, France)

Data classification in Internet of things for smart objects framework
Adil Chekati (University of Tunis El Manar, Tunisia); Meriem Riahi (ENSIT, University of Tunis, Tunisia); Faouzi Moussa (Faculty of Sciences of Tunis, Tunisia)

Performance Evaluation of Collision Avoidance Techniques using Wake-Up Radio in WSNs
Mayssa Ghribi (National Engineering School of Tunis, University of Tunis-El Manar, Tunisia); Aref Meddeb (National Engineering School of Sousse, University of Sousse, Tunisia)

SS7: SPECIAL SESSION ON ADVANCES IN MACHINE LEARNING FOR BUSINESS AND FINANCE

Friday, September 18, 14:30-16:00 (PALMA II)
SS7: Special Session on Advances in Machine Learning for Business and Finance

Chair: Zvonko Kostanjčar (University of Zagreb, Croatia)

Machine Learning and Cryptocurrency Markets
Nino Antulov-Fantulin (ETH Zurich)

Graph-Based Deep Learning Methods for Customer Churn Management
Karmela Ljubičić (Privredna banka Zagreb, Croatia)

Portfolio Backtesting Framework
Fredi Šarić (University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia)

Efficient Conversion Prediction in E-Commerce Applications with Unsupervised Learning
Peter Szabo and Bela Genge (University of Medicine, Pharmacy, Science and Technology of Targu Mures, Romania)

Estimating the number of latent factors in high-dimensional financial time series
Vanessa Keranović (University of Zagreb, Croatia); Stjepan Begušić (University of Zagreb, Croatia); Zvonko Kostanjčar (University of Zagreb, Croatia)

SS8: SPECIAL SESSION ON GREEN NETWORKINNG AND COMPUTING

Saturday, September 19, 08:30 - 10:00 (OLEANDAR)
SS8: Special Session on Green Networkinng and Computing

Chair: Joisp Lorincz (University of Split, Croatia)

EAGP: An Enrgy-Aware Gossip Protocol for Wireless Sensor Networks
Bruno Chianca Ferreira (Institut National des Sciences Appliquées & Ecole Nationale de l'Aviation Civile, France); Vítor Francisco Fonte (UNU-EGOV & Universidade do Minho, Portugal); João Marco C. Silva (HASLab, INESC TEC & Universidade do Minho, Portugal)

Analyses of user density impact on energy-efficiency metrics in 5G networks
Josip Lorincz, Zvonimir Klarin, Dinko Begusic (University of Split, Croatia)

Software-Defined Storage Optimization of Distributed ALICE Resources
Petra Loncar and Sven Gotovac (University of Split, Croatia)

Thursday, September 17, 14:00 - 15:30 (PALMA I)
SYM1/I: Symposium on Robotic and ICT Assisted Wellbeing I

Chair: Mirjana Bonković (University of Split, Croatia)

Software application for topology optimization of a link from a 3D printed educational robot
Ivan Chavdarov (Institut of Robitics, Bulgarian Academy of Sciences & Sofia University "St. Kliment Ohridski", FMI, Bulgaria); Bozhidar Naydenov (Dassault Systemes & Institut of Robitics, Bulgarian Academy of Sciences, Bulgaria)

Basic Characteristics of Handheld robotized systems in orthopedic surgery
George Boiadjiev (University of Sofia "St. Kliment Ohridski", Bulgaria); Tony Boiadjiev (IICT, Bulgarian Academy of Sciences, Bulgaria); Kamen Delchev (Sofia University, Bulgaria); Rumen Kastelov (Centre of Ministry of Interior, Bulgaria); Ivan Chavdarov (Institut of Robitics, Bulgarian Academy of Sciences & Sofia University "St. Kliment Ohridski", FMI, Bulgaria)

Deep Semantic Image Segmentation for UAV-UGV Cooperative Path Planning: A Car Park Use Case
Mirela Kundid Vasić (University of Mostar & Faculty of Mechanical Engeneering and Computing, Bosnia and Herzegovina); Ahmad Drak (Hochschule Bonn-Rhein-Sieg, Germany); Nediljko Bugarin, Stanko Kruzic and Josip Music (University of Split, Croatia); Christoph Pomrehn and Maximilian Schöbel (Hochschule Bonn-Rhein-Sieg, Germany); Maximilian Johenneken (Bonn-Rhein-Sieg University of Applied Sciences, Germany); Ivo Stancic and Vladan Papic (University of Split, Croatia); Rainer Herpers (Bonn-Rhein-Sieg University of Applied Sciences, Germany)

Forward Kinematic Analysis of JACO2 Robotic Arm Towards Implementing a Grapes Harvesting Robot
Theodore P Pachidis (Eastern Macedonia and Thrace Institute of Technology Kavala, Greece); Christos Sgouros (International Hellenic University (IHU), Greece); Vasileios Kaburlasos (Technological Educational Institute of Eastern Macedonia and Thrace, Greece); Eleni Vrochidou (International Hellenic University (IHU), Greece); Theofanis Kalampokas and Konstantinos Tziridis (Eastern Macedonia and Thrace Institute of Technology, Greece); Alexander Nicolaou and George A Papakostas (International Hellenic University, Greece)

Dynamics of a Planar Redundant Robot Based on Energy Conservation Law and Graph Theory
George Boiadjiev (University of Sofia "St. Kliment Ohridski", Bulgaria); Ivan Chavdarov (Institut of Robitics, Bulgarian Academy of Sciences & Sofia University "St. Kliment Ohridski", FMI, Bulgaria); Lyubomira Miteva (Sofia University, Bulgaria)

Thursday, September 17, 16:00 - 17:30 (PALMA I)
SYM1/II: Symposium on Robotic and ICT Assisted Wellbeing II

Chair: Mirjana Bonković (University of Split, Croatia)

Damage Analysis of Grassland from Aerial Images Applying Convolutional Neural Networks
Maximilian Johenneken (Bonn-Rhein-Sieg University of Applied Sciences, Germany); Ahmad Drak (Hochschule Bonn-Rhein-Sieg, Germany); Rainer Herpers (Bonn-Rhein-Sieg University of Applied Sciences, Germany)

Trajectory Planning for Redundant Robotic Manipulators with Constrained Joint Space
Lyubomira Miteva (Sofia University, Bulgaria); Ivan Chavdarov (Institut of Robitics, Bulgarian Academy of Sciences & Sofia University "St. Kliment Ohridski", FMI, Bulgaria); Kaloyan M Yovchev (Sofia University, Bulgaria)

Robot-Assisted Autism Spectrum Disorder (ASD) Interventions: A Multi-Robot Approach
Chris Lytridis, Cristina I. Papadopoulou and George A Papakostas (International Hellenic University, Greece); Vassilis Kaburlasos (Kavala Institute of Technology, Greece); Vasiliki Aliki Nikopoulou and Maria Dialechti Kerasidou (Papageorgiou General Hospital, Greece); Nikolaos Dalivigkas (Euroaction, Greece)

Head Pose Estimation Using Lattice Computing Techniques
Vassilis Kaburlasos (Kavala Institute of Technology, Greece); Chris Lytridis, Christos Bazinas, Stamatis Chatzistamatis and Kalliopi Sotiropoulou (International Hellenic University, Greece); Aouatif Najoua (ENSET, University Hassan II, Greece); Youssfi Mohamed (Labo SSDIA, ENSET Mohammedia, Morocco); Omar Bouattane (ENSET Hassan II University of Casablanca, Morocco)

PROFESSIONAL PROGRAM

Thursday, September 17, 09:00 - 10:30 (PALMA II)
WICT/I: Workshop on Information and Communication Technologies I

Chair: Ante Kristić (University of Split, Croatia)

5G Mobile Technologies and Early 6G Viewpoints
Ivan Petrov (Makedonski Telekom, Macedonia); Toni Janevski (Ss. Cyril and Methodius University in Skopje, Macedonia)

PA's Data Center Management: Billing and Services Monitoring System
Enrica Salbaroli (Lepida SpA, Italy); Gianluca Mazzini (University of Ferrara and LepidaSpA, Italy)

Algorithms for graph isomorphism. A comparative study on STwig and VF2
Gheorghica Radu-Iulian (Babeș-Bolyai University & Faculty of Mathematics and Computer Science, Romania)

Modeling Cassandra Data Structure and Queries Using a Graph Based Knowledge Representation
Camelia Florina Andor (Babes-Bolyai University, Romania); Viorica Varga (Babes Bolyai University, Romania); Christian Săcărea (Babeș-Bolyai University, Romania)

Conceptual Graphs for NoSQL Performance Benchmarking
Camelia Florina Andor, Adrian Telcian and Christian Săcărea (Babes-Bolyai University, Romania)

Thursday, September 17, 11:00 - 12:30 (PALMA II)
WICT/II: Workshop on Information and Communication Technologies II

Chair: Ante Kristić (University of Split, Croatia)

Influence of UV radiation on shielding efficiency of conductive textile materials
Krešimir Malarić and Valentina Marinčević Petračić (University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia); Bosiljka Šaravanja (Universty of Zagreb, Faculty of Textile Technology, Croatia); Damir Muha (University of Zagreb, Croatia); Tanja Pušić (University of Zagreb, Faculty of Textile Technology, Croatia)

Epics Implementation for active magnetic field control
Donny Cosic (University of Split & Ruđer Bošković Institute, Croatia); Joško Radić and Mladen Russo (University of Split, Croatia)

Multi-RRH cooperative Optimization for OFDMA Resource Allocation in Millimeter-Wave CRAN
Nan Li (Purple Mountain Laboratory: Networking, Communications and Security, China); Zhenjie Yao (Institute of Microelectronics, Chinese Academy of Sciences & Purple Mountain Laboratory: Networking, Communications and Security, China); Yanhui Tu (Purple Mountain Laboratory: Networking, Communications and Security, China); Yixin Chen (Washington University in St Louis, USA)

An Advanced NOMA Security Technique for Future Wireless Communication
Muhammad Furqan Zia and Jehad Hamamreh (Antalya Bilim University, Turkey)

Application of GNSS system as a source of time reference for a mobile network
Filip Adžić and Katarina Radoš (University of Split, Croatia), Ivan Dražić Šegrt (Ericsson Nikola Tesla, Croatia)

TIMETABLE A: TECHNICAL PROGRAM, SYMPOSIA

Thursday, September 17 (virtual)

Time/Hall	OLEANDAR	RUŽMARIN	PALMA I
09:00–10:30	S1/I: Machine Learning Applications I	S4/I: Wireless Communications I	
10:30–11:00	Coffee Break		
11:00–12:30	S1/II: Machine Learning Applications II	S4/II: Wireless Communications II	S5: Optical Communications
14:00-15:30	S2: Signal Processing and Coding	S3: 5G Technologies	SYM1/I: Symposium on Robotic and ICT Assisted Wellbeing I
15:30–16:00	Coffee Break		
16:00–17:30	S7: Vehicular Networks	S6: Software Development Methods	SYM1/II: Symposium on Robotic and ICT Assisted Wellbeing II

Friday, September 18 (virtual)

Time/Hall	OLEANDAR	RUŽMARIN	PALMA I
09:00–10:30	SS1: Special Session on QoS in Wired and Wireless Networks	SS2: Special Session on Advanced Educational Technologies	SS4: Special Session on Security and Digital Forensics
10:30–11:00	Coffee Break		
11:00–12:00	OPENING CEREMONY		
11:00–12:00	**Keynote Speech:** **Sinisa Krajnovic (Executive Vice President and Head of Digital Services, Market Area North East Asia at Ericsson),** **5G: New Engine of Digital Economic Growth**		
14:30–16:00	SS3: Special Session on Service Quality, Reliability and Security	SS5: Special Session on Environmental Electromagnetic Compatibility (EEMC)	SS6: Special Session on Ad Hoc&Sensor Networks and Internet of Things

Saturday, September 19 (virtual)

Time/Hall	OLEANDAR
08:30–10:00	SS8: Special Session on Green Networkinng and Computing
10:00–10:30	Coffee Break
10:30–12:00	P1: Posters /Abstracts Session

TIMETABLE B: WORKSHOPS, TUTORIALS, BUSINESS FORUM

Thursday, September 17 (virtual)		
Time/Hall	**PALMA II**	**KAKTUS**
09:00–10:30	WIICT/I: Workshop on ICT I	Industry Panel: Broadband Internet Access in Croatia 1
10:30–11:00	**Coffee Break**	
11:00 – 12:30	WIICT/II: Workshop on ICT II	Industry Panel: Broadband Internet Access in Croatia 2
14:00-15:30	Tutorial T1 (D. Poljak) Some Efficient Methods in Computational Electromagnetics (CEM)	
15:30–16:00	**Coffee Break**	
16:00–17:30	Tutorial T2 (Khalil El Khamlichi Drissi) *Analysis of Electrophysiological Activities using Matrix Pencil Method*	

Friday, September 18 (virtual)		
Time/Hall	**PALMA II**	**KAKTUS**
09:00–10:30	9th Workshop on Software Engineering in Practice (WSEP)	
10:30–11:00	**Coffee Break**	
11:00–12:00	**OPENING CEREMONY (GRAND BALLROOM)** **Keynote Speech:** **Sinisa Krajnovic (Executive Vice President and Head of Digital Services, Market Area North East Asia at Ericsson),** **5G: New Engine of Digital Economic Growth**	
14:30-16:00	SS7: Special Session on Advances in Machine Learning for Business and Finance	PHD FORUM · *Workshop on Software Development (AGAVA)*

Saturday, September 19 (virtual)	
Time/Hall	**PALMA II**
08:30–10:00	**iWORKSHOP: 7 x iSkills**
10:00–10:30	**Coffee Break**
10:30–12:00	SYM2: Symposium on Information Security and Intellectual Property (ISIP) Invited talk: Ivan Vukušić Invited talk: Vlatka Ružić

Saturday, September 19, 10:30 - 12:00

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

ISIP INVITED TALK: IVAN VUKUŠIĆ

FOOD FRAUD - CRIMINAL PROTECTION IN CROATIA

Ivan Vukušić, PhD
Assistent Professor, University of Split Faculty of Law, Croatia

Summary:
Food fraud is the act of purposely altering, misrepresenting, mislabeling, substituting or tampering with any food product at any point along the farm–to–table food supply–chain. Fraud can occur in the raw material, in an ingredient, in the final product or in the food's packaging. Fraudulent and intentional substitution, dilution or addition to a raw material or food product, or misrepresentation of the material or product for financial gain (by increasing its apparent value or reducing its cost of production) or to cause harm to others (by malicious contamination), is 'food fraud. For this action in Croatia are prescribed misdemeanours. Misdemeanors usually do not result in the restriction of civil rights, but may result in loss of privileges, such as professional licenses, public offices, or public employment. Such effects are known as the collateral consequences of criminal charges. This is more common when the misdemeanor is related to the privilege in question, or when the misdemeanor is deemed to involve moral turpitude—and in general is evaluated on a case-by-case basis. Executives can be convicted of a misdemeanor for 'holding a position of authority and having had the ability to prevent a food safety violation. A misdemeanor is considered a crime of lesser seriousness, so presentation will show most important characteristics of Croatian judicary and comparison of misdemeanour and criminal offences.

Biography: *Ivan Vukušić was born in 1985. He graduated at the Split Faculty of Law in 2007. On 1 March 2008. began working at Faculty of Law in Split as junior researcher, employed on the scientific project: "Jerolim Micelovic – Michieli – Great Croatian penologist" and now is on project "European characteristics and problems of the Croatian system of executing the punishment of deprivation of liberty". From 2008. to 2009. volunteered as judicial trainee at Split County Court an passed Bar exam in 2011.*
From 1st February to 1st March 2009 she was on student residence at Faculty of Law, Free University in Berlin, Germany within the Tempus project JEP-41011-2006. He visited Freiburg at Max Planck Institute for Foreign and International Criminal law, UNODC seminars in Doha and Tirana on topic of organized crime and corruption, Law faculty in Hagen and presented his papers on national and international conferences. At this time, he is Assistent Professor at Faculty of Law Split, Croatia.

ISIP INVITED TALK: VLATKA RUŽIĆ

THE MOVEMENT AND STRUCTURE OF CYBERCRIME IN THE REPUBLIC OF CROATIA – SOME NEW TRENDS?

Vlatka Ružić, PhD
Polytechnics Nikola Tesla, Gospić, Croatia

Summary:
Cybercrime is the greatest threat to every company in the world; according to Cybersecurity Ventures report (2019) cybercrime will cost the world $6 trillion annually by 2021, up from $3 trillion in 2015. This represents the greatest transfer of economic wealth in history and will be more profitable than the global trade of all major illegal drugs combined. In terms of cybercrime risk Croatia is no exception; according to Specops Software survey (2019) Croatia ranked 10th on the list of top ten cyber insecure Western European countries and is likely to encounter ransomware attack as well as cryptocurrency mining encounters. This research shows the number, type and trends of cyber incidents and cybercrime offences in Croatia; by using least squares method and regression analysis authors determined that the two most frequent types of cyber attacks in Croatia are the theft of confidential data and the revealing of confidential data using fraud. The significance of this research is derived from the assessment of trends in the type and structure of cybercrime in Croatia, making it possible to predict future cyber threats for Croatia. This is particularly important because tourism in Croatia accounts for more than 20% of GDP, and the same industry has a huge amount of data that is the subject of the cyber criminals' interest.

The limitations of the research lie in the fact that the number of cybercrime incidents is significantly higher than the official reported numbers, because not all cybercrime victims report them.

Biography: *Vlatka Ružić, PhD graduated in economy in 2003, in 2006 she obtained a scientific title as a master of economic sciences (MSc), while in 2014 she earned an academic degree of a doctor of political sciences. From 2006 to 2013 she worked as PR & marketing manager at the Plitvice Lakes National Park, while currently (since 2016) she has been working as dean at the Nikola Tesla Polytechnic in Gospic. Over the past ten years she has performed numerous functions in various committees and administrative councils of various institutions in Lika-Senj County, either as president of the same or as a member. She is the current president of the Councilor club of City Council of Otočac, and a permanent court interpreter for the English language. She speaks German, English and Italian language. Since 2009 she has been at Nikola Tesla College in collaborative and teaching positions in the field of political and economic sciences. She participated in numerous expert and scientific conferences and published a large number of scientific and expert articles in relevant domestic and international publications.*

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

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

Electronic Evidence in Civil Proceedings
Dinka Šago (University of Split & Faculty of law, Croatia)

Cloud accounting - security, reliability and propensity of accounting staff to work in cloud accounting
Marija Boban (University of Split Faculty of Law, Croatia); Valentina Vinšalek Stipić (Polytechnic Nikola Tesla Gospic, Croatia)

PhD FORUM

The PhD Forum provides an opportunity for doctoral students to present their work related to the SoftCOM 2020 conference topics to a wider community of researchers from academia and industry. The forum aims to encourage interaction and networking among doctoral students, as well as with the audience.

The PhD Forum has been organized as a poster session, preceded by a fast-paced introduction by each student that offers a preview of the posters. Each student has a strictly-timed 2-minutes' slot to present a "pitch talk" about her/his research. The purpose of the pitch talk is to provide a brief outline of one's doctoral research work, with the goal to raise awareness and generate further discussion over the poster session.

Steering committee:

Dinko Begušić, University of Split
Tihana Galinac Grbac, Juraj Dobrila University of Pula
Darko Huljenić, Ericsson Nikola Tesla
Maja Matijašević, University of Zagreb
Drago Žagar, Josip Juraj Strossmayer University of Osijek

Program & Organizing Committee:

Maja Škiljo, University of Split, Chair
Andrej Grgurić, Ericsson Nikola Tesla
Višnja Križanović, Josip Juraj Strossmayer University of Osijek
Goran Mauša, University of Rijeka
Mirko Sužnjević, University of Zagreb

AR-based Serious Game for Improving Social Inclusion of People With Disabilities
Iva Topolovac and Dario Pevec (University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia); Zeljka Car (University of Zagreb Faculty of Electrical Engineering and Computing, Croatia)

CudDNN Convolution Algorithms on Nvidia GPU
Nediljko Bugarin (University of Split, Croatia)

Energy Detection in MIMO Cognitive Radio Networks
Ivana Ramljak (University of Mostar, Bosnia and Herzegovina); Josip Lorincz and Dinko Begusic (University of Split, Croatia)

Impact of Video Segmentation on Switching in Adaptive Streaming
Jelena Vlaovic (J. J. Strossmayer University of Osijek & Faculty of Electrical Engineering, Computer Science and Information Technology Osijek, Croatia); Drago Zagar (Faculty of Electrical Engineering, Computer Science and Information Technology Osijek, Croatia); Snjezana Rimac-Drlje (Faculty of Electrical Engineering, Computer Science and Information Technology Osijek & Josip Juraj Strossmayer University of Osijek, Croatia)

Mobility as a Service: Stakeholders and Challenges
Ivana Gace (University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia); Jurica Babic (University of Zagreb & Faculty of Electrical Engineering and Computing, Croatia)

Modelling and Validation of a Specialized Vehicle CAN Bus Simulator
Hrvoje Vdović (University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia); Jurica Babic (University of Zagreb & Faculty of Electrical Engineering and Computing, Croatia); Vedran Podobnik (University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia)

Roadmap for Development of Accessible Software Solutions Based on Emerging Technologies
Matea Zilak (University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia); Zeljka Car (University of Zagreb Faculty of Electrical Engineering and Computing, Croatia)

New QGIS layers for Search and Rescue missions planning
Ana Šarić Gudelj and Vladan Papic (University of Split, Croatia)

TUTORIALS

Dragan Poljak, PhD
University of Split, FESB Split, Croatia

Some Efficient Methods in Computational Electromagnetics (CEM)

Abstract: The lecture starts with some general aspects of computational electromagnetics and electromagnetic compatibility (EMC). The introduction outlines some well-established analytical and numerical methods.

First, a crash-course on the theory of thin wire antennas will presented and related numerical solution methods for various integral equations in both frequency and time domain will be carried out. Computational examples pertaining to dipoles, Yagi-Uda arrays and logarithmic-periodic dipole antennas (LPDA) will be presented. Then, some applications to air trafic control and ground penetrating radar (GPR) will be discussed, as well.

Furthermore, full wave (antenna) models for various thin wire structures, from rather simple to realistic complex geometries, will be outlined. This will be followed by studies of overhead and buried transmission lines, respectively. In particular, a trade-off between the use of rigorous full wave models and approximate transmission line (TL) approach will be emphasized. Particular attention will be focused to the study of PLC (Power Line Communications) configurations, modeling of lightning channel, transient analysis of realistic grounding systems (with particular emphasis to wind turbines).

Then Tutorial will also tackle the human exposure to non-ionizing electromagnetic fields. Low frequency, high frequency and transient exposures related to possible adverse health effects will be discussed addressing electromagnetic interference (EMI) sources such as power lines, transformer substations, base stations antennas for 2G/3G/4G and 5G systems. Some biomedical application of electromagnetic fields, with particular emphasis on transcranial magnetic stimulation (TMS), transcranial electric stimulation (TES) and nerve fiber stimulation, will be also mentioned.

Furthermore some stochastic analysis methods (featuring the use of stochastic collocation (SC) technique) applied to area of GPR, grounding electrodes, human exposure to electromagnetic fields and biomedical application of electromagnetic fields will be presented.

The presentation will end up with some topics in magnetohydrodynamics pertaining to the modeling of plasma physics phenomena pertaining to the applications in thermonuclear fusion.

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 Member of Board of Directors of Wessex Institute of Technology. His research interests include frequency and time domain computational methods in electromagnetics with applications in electromagnetic compatibility, bioelectromagnetics and plasma physics. To date Professor Poljak has published few hundreds of journal and conference papers in the area of computational electromagnetics, and authored/co-authored or edited number of books and book chapters published by WIT Press, Wiley and Elsevier, Professor Poljak is a member of IEEE, a member of the Editorial Board of the journal Engineering Analysis with Boundary Elements, Academic Editor of the journal Mathematical Problems in Engineering and Associate Editor of the journal IET Science, Measurement & Technology. He serves as a co-chairman of many WIT International Conferences. He is also editor of the WIT Press Book Series Advances in Electrical Engineering and Electromagnetics. In June 2004, professor Poljak was awarded by the National Prize for Science. In 2013 he was awarded by the Nikola Tesla Prize for achievements in Technical Sciences, in 2016. He received the prize for the achievements in engineering education from Croatian IEEE chapter and in 2017 he received the prize for science from the University of Split.*

In July 2019 Prof Poljak received Technical Achievement Award by the IEEE Electromagnetic Compatibility Society for contributions to computational dosimetry for human exposure to electromagnetic fields.

From 2011 to 2015 professor Poljak was the Vice-dean for research at the Faculty of electrical engineering, mechanical engineering and naval architecture. In 2011 professor Poljak became a member of WIT Bord of Directors. In June 2013 professor Poljak became a member of the board of the Croatian Science Foundation.

Khalil El Khamlichi Drissi, PhD

Institut Pascal, CNRS, UMR6602, Clermont Auvergne University, France

Analysis of Electrophysiological Activities using Matrix Pencil Method

Abstract: The electrically Evoked Compound Action Potential (ECAP) is a measure of the electrical response of neural tissue. ECAP results from the sum of the contributions from all the fibers that respond. ECAP on ex-vivo sciatic nerve of rats is recorded, responding to electrical stimulation (0.2-2V, 50-200µs). Currently, ECAP analysis is based on its amplitude only. In our study, Matrix Pencil Method (MPM) is used to represent additional characteristics of ECAP.

Using MPM, one obtains more accurate analysis of the ECAP signal within fixed normalized mean square error limits. In our experiment, the identification extracts three basic functions, signed by their complex frequencies and amplitudes. The principal function represents the signal by amplitude and a fundamental frequency. The second and third basic functions improve, respectively, the ECAP depolarization and repolarization rate. Then, the function parameters have been related to the input stimulus parameters (duration and amplitude) with simple transfer functions.

It became easier to build a robust electronic control between Electrical Neurostimulation and ECAP response for pain modulation and achieve a closed-loop setup with additional control parameters.

Biography: *Khalil El Khamlichi Drissi received the Diploma Engineer, M. Sc., and PhD degrees in Electrical Engineering from Ecole Centrale de Lille and the University of Lille, in 1987 and 1990 respectively. He received the Habilitation in electronics, the highest qualification in France; at the Doctoral School "Sciences Pour l'Ingénieur" of Blaise Pascal University, in 2001. Pr. Khalil EL KHAMLICHI DRISSI became Vice President of Research Valorisation, UBP chancellor board from April 2012 until December 2016. He is Full Professor at the Department of Electrical Engineering where he was the dean in the period from 2007 to 2011. Currently, he is Vice Regional Delegate of Research and Technology (DRRTA) for The Auvergne-Rhône-Alpes Region. He is also senior researcher at Institute Pascal Laboratory and his research interests include EMC in Power Electronics and Power Systems, in particular; numerical modeling, EMI reduction and converter control. He authored or coauthored more than 270 scientific papers published in peer-review journals and presented at international conferences, (68 scientific papers published since 2015).*

Pr. El Khamlichi Drissi is a senior member of IEEE and EEA and has been chairperson and member of scientific committees at international conferences. He is project leader and responsible for several international projects related to EMC (FP7 Marie Curie, Cogito, Econet, Cedre, Integrafm, Toubkal, Tassili, etc.) and a partner within the Brain City Research Institute and COST Networks. He currently has an on-going collaboration with different companies (IFPEN, EDF, France Telecom and Landis+Gyr).

Saturday, September 19, 08:30-10:00 (PALMA II)

iWORKSHOP: 7 x iSkills

"If you look at history, innovation doesn't come just from giving people incentives; it comes from creating environments where their ideas can connect."

— Steven Johnson

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 within ICT in the last few decades – has expanded the solution space and its application to almost any problem domain. However, packaging those solutions into a product or a service that will fulfil customer needs is still a challenge faced by numerous startups. That said, having a solution does not imply having a product as well. In this iWorkshop, seven fundamental innovation skills will be presented by the moderator, and then applied onto real world use cases in a dynamic discussion with the audience. The audience will then rate and score each skill by its relevance and applicability in their own personal and/or professional innovation process. The goal of the workshop is to give the audience an opportunity to participate in the innovative process and self-evaluate their own innovation "gap" or current skills.

Moderator:

Marko Bervanakis, Ericsson Nikola Tesla d.d., Zagreb

Ericsson Innovation Awards - Global Mentor Manager, Coach and Facilitator at Ericsson Nikola Tesla d.d. In the past, he has also worked in other Global Telecoms companies (both in Europe & in the Asia pacific region) as a technical trainer, educator, consultant, technical manager and innovation facilitator. Today, he also serves as a key core and leadership team member in the organization and execution of Ericsson's annual global Ericsson Innovation Awards (EIA) challenge for University students - globally. He has won several company Innovation awards and runs innovation workshops around the globe.

Friday, September 18, 09:00-10:30 (KAKTUS)

WSEP: 9TH 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 50 billion of 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 2020 conference.

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

Biography:

Dr. Darko Huljenić 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, in the Faculty of Electrical Engineering and Computing, Telecommunications.

Development of mobile application for accessing medical informational system

Ana Šundov (University of Split, Croatia)

A system for time recording of individual actions in the test automation framework
Marina Vidović, Gordana Ukic Zaja (Ericsson Nikola Tesla d.d., Croatia)

Friday, September 18, 14:30-16:00 (AGAVA)

UNIVERSITY AND INDUSTRY COLLABORATION: Workshop on Software Development - Master Thesis Use Cases

*"Coming together is a beginning, staying together is progress,
and working together is success."*

— Henry Ford

"The collaboration between universities and the industry is increasingly perceived as a vehicle to enhance innovation through knowledge exchange. This is evident by a significant increase in studies that investigate the topic from different perspectives."[1] The goal of this workshop is to reflect on this collaboration from a Master theses perspective where students do their practical part of their Master thesis within a company. Such collaboration serves as a starting point for students to experience firsthand what it means to work for a company and publish their findings as their Master thesis.

In this workshop, students will provide their point of view on how they started their journey to realize their collaboration with university and industry. They will briefly present their Master thesis findings and contributions, as well as provide feedback on their personal experience of being part of this collaboration. Later, we will encourage discussion in order to highlight the benefits and pain points of this collaboration and try to extract guidelines for improvement.

Master thesis presentations:

- **Operability of Telecommunication Cells in Connection with Base Station Synchronization**, Tomislav Baricevic
- **Unit Test of the Fronthaul Network**, Marijeta Barisic
- **Remote Sensing for Environmental Monitoring**, Lucija Viskovic
- **Dynamic Code Verification**, Josip Matkovic

Moderator:

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

Toni is a researcher at Ericsson Nikola Tesla d.d., Research department. He did his bachelor and master 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 researcher and later on as an 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.

Prof. dr. sc. Linda Vicković, assoc. prof. at Faculty of electrical engineering, mechanical engineering and naval architecture, University of Split)
She is assoc. prof. at the Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture (FESB), University of Split, Croatia. Her research interests include software engineering, data mining, discrete event simulation, performance evaluation and optimization. Contact her at linda.vickovic@fesb.hr.

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[1] Samuel Ankrah, Omar AL-Tabbaa, *Universities–industry collaboration: A systematic review*, Scandinavian Journal of Management, Volume 31, Issue 3, 2015, Pages 387-408, https://doi.org/10.1016/j.scaman.2015.02.003.

GENERAL INFORMATION

ABOUT
The 28th International Conference on Software, Tele-communications and Computer Networks (SoftCOM 2020) will be held virtually.

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

LANGUAGE
The Conference language is English.

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