

Table of Contents

Keynote: Optical Camera Communication for Intra-satellite networking

Yirang Wang, Jingyi Fan, Xiaomeng Xiang and Bing Liu

Keynote: The Goal-oriented Semantic Model and the Future of Ultra-modern Telecommunications and Control Systems

Dr. Alessandro Vizzarri, University of Rome Tor Vergata

Machine Learning in Real-world Detection and Recognition Applications

DeepMedFuseX: Explainable DeepFake Cancer CT Scan Classification with Multi-Scale

Attention and Transfer Learning1

Sidharth Gupta, Tuhina Nandi and Abhishek Kaushal (Amity University, India); Anzhelika Mezina (Brno University of Technology, Czech Republic); Radim Burget (BUT - Brno University of Technology, Czech Republic); Malay Kishore Dutta (Amity University, NOIDA, India)

NeuroAttention-Net: Deep Learning with Channel Attention for Robust Epileptic Seizure

Detection from EEG Spectrograms7

Abdullah Habib (Amity University, Noida, India); Rakesh Chandra Joshi (Amity University, India); Atishay Jain (Amity University, Noida, India); Jitender Jadon (Amity University, India); Vojtech Myska (BRNO University of Technology, Czech Republic); Jan Dorazil (Brno University of Technology & TU Wien, Czech Republic)

Enhancing Plant Disease Detection with CNNs and LLMs: A Comprehensive Approach to

Diagnosis and Mitigation13

Siddharth Sharma, Divyan Tiwari and Avaneesh Garg (Amity University, Noida, India); Abhishek Kaushal (Amity University, India); Anzhelika Mezina and Jakub Frolka (Brno University of Technology, Czech Republic); Malay Kishore Dutta (Amity University, NOIDA, India)

Automatic Traffic Camera Calibration Using 3D Scene Reconstruction with Structure-from-

Motion and Custom Image Data19

Stepan Jezek, Petr Kriz, Kamil Riha and Radim Burget (Brno University of Technology, Czech Republic); Matej Dusik (Yunex Traffic, Czech Republic)

Using Water Flow and Pressure Data for Activity Recognition in Smart Homes25

Petr Kriz, Petr Cika and Martin Stusek (Brno University of Technology, Czech Republic)

Advanced Telecommunication Techniques and Solutions

Multiple-Output Current Follower/Amplifier Based on IC Devices30

Lukas Langhammer (University of Defence, Czech Republic); Roman Sotner (Brno University of Technology, Faculty of Electrical Engineering and Communication, Czech Republic)

MOS Transistor as a Distributed Resistive-Capacitive Element with Admittance of Fractional

Order 0.536

David Kubanek, Aleksandr Shadrin and Jan Jerabek (Brno University of Technology, Czech Republic)

High-Bandwidth High-N-Point SPICE Model of Fractional Integrator/Differentiator42

Dalibor Biolek (University of Defence Brno, Czech Republic); Viera Biolkova and Zdenek Kolka (Brno University of Technology, Czech Republic); Roberto Garrappa (University of Bari, Italy)

Design of Fractional-Order Chebyshev Filter with FOE Based on R-C-NR Structure48

Jan Dvorak, David Kubanek, Jan Jerabek and Pavel Šeda (Brno University of Technology, Czech Republic); Rowan Aldridge (The University of Alabama, USA)

The R2Detune SW based on the Erlich's two-dimensional system.....	54
Ondrej Jirasek (BUT Brno, Czech Republic & JAMU Brno, Czech Republic); Ari Dvořák (Self-Employed, Czech Republic)	

Wireless Communication Technologies

Efficient User Equipment Distribution in DUDe 5G Network using Linear Assignment Algorithms.....	60
---	-----------

Konstantinos Tsachrelas, Chrysostomos Athanasios Katsigiannis and Vasileios Kokkinos (University of Patras, Greece); Apostolos Gkamas (University of Ioannina, Greece); Christos J Bouras (University of Patras - ELKE, Greece); Philippos Pouyioutas (University of Nicosia, Cyprus)

Modeling of Energy Consumption for LTE Cat-M with PSM and eDRX.....	66
--	-----------

Thao Dinh Le (Brno University of Technology, Czech Republic); Pavel Masek (Brno University of Technology & Member of WISLAB Group, Czech Republic); Martin Stusek and Pavel Palurik (Brno University of Technology, Czech Republic); Dmitri Moltchanov (Tampere University, Finland); Petr Mlynek and Jiri Hosek (Brno University of Technology, Czech Republic)

Potential of mMTC Support over Low Earth Orbit Systems: Challenges and Preliminary Assessment	73
--	-----------

Pavel Palurik and Martin Stusek (Brno University of Technology, Czech Republic); Dmitri Moltchanov (Tampere University, Finland); Konstantin Mikhaylov (University of Oulu, Finland); Pavel Masek (Brno University of Technology & Member of WISLAB Group, Czech Republic); Radim Dvorak, Thao Dinh Le, Radek Možný and Jiri Hosek (Brno University of Technology, Czech Republic)

Two-Way Relay NOMA Systems under Impacts of Hardware Impairments and CCI	80
---	-----------

Phu Si Le (VSB Technical University of Ostrava, Czech Republic); Miroslav Voznak (VSB - Technical University of Ostrava, Czech Republic); Hong-Nhu Nguyen and Tien Xuan Nguyen (Saigon University, Vietnam); Khoa Nguyen Dang Dinh (Technical University of Ostrava, Czech Republic); Giovanni Salvatore (Ca' Foscari University of Venice, Italy)

AI-driven Data Processing Applications

AI-Driven Decision Support System for Real-Time Ganga River Water Quality Monitoring and Forecasting Using IoT Sensors.....	88
--	-----------

Nitya Pillai, Akshara Sharma and Amisha Gupta (Amity University, India); Anoushka Gupta (Amity University, USA); Pavel Sikora and Kamil Riha (BRNO University of Technology, Czech Republic); Malay Kishore Dutta (Amity University, NOIDA, India)

An Advanced COVID-19 Severity Grading Approach using Deep Soft Attention Networks and Segmentation of Chest X-ray Images	94
---	-----------

Anshika Chauhan and Rakesh Chandra Joshi (Amity University, India); Suzain Rashid and Garima Aggarwal (Amity University, Noida, India); Vojtech Myska (BRNO University of Technology, Czech Republic); Radim Burget (BUT - Brno University of Technology, Czech Republic); Malay Kishore Dutta (Amity University, NOIDA, India)

KiFramework - A Federated Learning Platform	100
--	------------

Jakub Michálek (Brno University of Technology, Czech Republic); Vaclav Oujezsky (Masaryk University, Czech Republic & Brno University of Technology, Czech Republic); Vladislav Skorpil (Brno University of Technology, Czech Republic)

Semantic Fusion of Text and Images: A Novel Multimodal-RAG Framework for Document Analysis	106
---	------------

Tuhina Nandi, Sidharth Gupta and Abhishek Kaushal (Amity University, India); Radim Burget (BUT - Brno University of Technology, Czech Republic); Stepan Jezek (BRNO University of Technology, Czech Republic); Malay Kishore Dutta (Amity University, NOIDA, India)

SDAG-CNN: Attention-Guided Convolutional Neural Network for Spinal Lesion Diagnosis and Multi-Class Classification of X-ray Radiographs.....111

Suzain Rashid (Amity University, Noida, India); Rakesh Chandra Joshi and Anshika Chauhan (Amity University, India); Garima Aggarwal (Amity University, Noida, India); Petr Kriz (Brno University of Technology, Czech Republic); Radim Burget (BUT - Brno University of Technology, Czech Republic); Malay Kishore Dutta (Amity University, NOIDA, India)

Keynote: Positioning for Industrial Applications: New Trends, Artificial Intelligence, and Open ScienceKeynote

Cybersecurity and Advanced Network Design

Design and Implementation of I2V Vehicle Speed Limiting From Backoffice.....117

Pavel Šeda, Jan Dvorak, Jan Pospisil and Zdenek Martinasek (Brno University of Technology, Czech Republic); Martin Srotyr and Igor Miklosik (Czech Technical University in Prague, Czech Republic); Lukas Malina (Brno University of Technology, Czech Republic); Zdenek Lokaj (Czech Technical University, Czech Republic); Miloš Šeda (Brno University of Technology, Faculty of Mechanical Engineering, Czech Republic); Vladimír Taborsky (Czech Technical University in Prague, Czech Republic)

Quantum-Resistant Key Management and Archiving in Cloud Storage System for Digital Evidence123

Lukas Malina (FEEC, Brno University of Technology, Czech Republic); Petr Muzikant, Filip Wojnar, Petr Dzurenda and Jan Hajný (Brno University of Technology, Czech Republic)

Data Clustering and Categorization for Processing Results from Penetration Testing131

Willi Lazarov and Zdenek Martinasek (Brno University of Technology, Czech Republic)

Smart Meter Cyber Security Testing137

Petr Mlynek, David Kohout and Tomáš Lieskovan (Brno University of Technology, Czech Republic)

Offline Keyless Vehicle Entry for Car-sharing using Privileged Access Tokens.....141

Petr Dzurenda (Brno University of Technology, Czech Republic); Petr Ilgner (Brno University of Technology, Faculty of Electrical Engineering and Communication, Czech Republic); Minh Tran (Brno University of Technology, Czech Republic); Lukas Malina (FEEC, Brno University of Technology, Czech Republic); Pavel Kristof and Anatolij Makarov (Institute of Microelectronic Applications, Czech Republic); Pavel Loutocky and Frantisek Kasl (Masaryk University, Czech Republic)

WeaRIoT'2024 workshop

Feasibility Analysis of Self-oriented BLE Anchors Powered by NEMA Motors for DoA-based Indoor Positioning149

Teodor Constantin Din, Miguel Matey-Sanz, Adrián Bautista and Sergio Trilles (Universitat Jaume I, Spain); Joaquín Torres-Sospedra (Universitat de València, Spain)

Coexistence Niche of Ultra-Wideband and Wi-Fi: Suspected Spurious Signal Reception in Channel 5155

Radovan Juran (Brno University of Technology, Czech Republic); Jari Nurmi and Aleksandr Ometov (Tampere University, Finland)

Error Bound Estimation for Fingerprinting-Based Indoor Positioning Systems Using Monte Carlo Simulations.....160

Cristian Valero-Abundio, Raul Montoliu, Marina Martinez-García and Emilio Sansano-Sansano (University Jaume I, Spain); Joaquín Torres-Sospedra (Universitat de València, Spain); Antoni Perez-Navarro (Universitat Oberta de Catalunya, Spain)

Towards Emotion Mapping for Multimodal Unobtrusive Stress Monitoring.....	166
Hsiao-Chun Lin and Aleksandr Ometov (Tampere University, Finland); Otso Arponen (Tampere University Hospital, Finland); Kaarina Nikunen and Jari Nurmi (Tampere University, Finland)	

The Possibilities and Challenges of Passively Sensing Young People's Loneliness	171
Lotta Ylinen (Tampere University, Finland); Elena Simona Lohan (Tampere University, Finland & Universitat Autònoma de Barcelona, Spain); Sirkku Kotilainen (Tampere University, Finland); Oana Cramariuc (CITST, Romania); Atte Oksanen (Tampere University, Finland)	

Wireless Systems and IoT Applications

Implementation of an NB-IoT Rain Gauge for Opportunistic Rainfall Sensing	179
Petr Musil, Matěj Ištvánek, Miroslav Baběřa, Jan Hejna, Jiří Jílek, Štěpán Miklánek, Radek Možný, Michal Mahút and Petr Mlynek (Brno University of Technology, Czech Republic)	

Multipurpose IoT Unit for Wireless Current Measurement in HV Networks	185
Martin Rusz, Petr Mlynek and Daniel Haluska (Brno University of Technology, Czech Republic)	

Performance Evaluation of the Mobile-IoT Technologies for Over-the-Air Updates	190
Radek Možný, Radim Dvorak and Martin Stusek (Brno University of Technology, Czech Republic); Dmitri Moltchanov (Tampere University, Finland); Pavel Masek (Brno University of Technology & Member of WISLAB Group, Czech Republic); Pavel Palurik, Thao Dinh Le, Petr Cika, Petr Mlynek and Jiri Hosek (Brno University of Technology, Czech Republic)	

Angle of Arrival estimation - Sionna ray tracing versus real-world measurements.....	195
Šimon Sloboda, Roman Marsalek, Marek Simka, Jan Kufá and Ladislav Polak (Brno University of Technology, Czech Republic)	

Optimizing Low-Power Communication Protocols for External Pacemakers: Collision Prevention and Reliability in Multi-Patient Scenarios	199
Jakub Frolka, Karel Slavicek and Pavel Šeda (Brno University of Technology, Czech Republic)	

Virtual Management, Training and Education Tools

Virtualized Smart Metering Training	205
David Kohout, Tomáš Lieskovan and Petr Mlynek (Brno University of Technology, Czech Republic)	

Curricula Designer 2024: Enhanced Web Application for Cybersecurity Program Design.....	210
Jan Hajný, Marek Sikora, Petr Cika, Sara Ricci and Lisa Moravek (Brno University of Technology, Czech Republic)	

vSafe Management Front Panel Design and Development.....	216
Pavel Novak (Masaryk University, Czech Republic); Vaclav Oujezsky (Masaryk University, Czech Republic & Brno University of Technology, Czech Republic); David Konstansky (Masaryk University, Czech Republic)	