

2022

Nizar Zorba (Chair)

Angelos Antonopoulos (Vice-chair)

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**COMMUNICATIONS SYSTEMS INTEGRATION
AND MODELING TECHNICAL COMMITTEE**

CSIM-TC

NEWSLETTER

November 2022

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1. About CSIM

The Communications Systems Integration and Modeling technical committee focuses its activities on simulation, analytical tools and measurement of communications links and networks. CSIM has been sponsoring activities on traffic modeling, performance and integration of next generation wireless and wireline networks.

CSIM sponsors its traditional workshop CAMAD, as well as special issues in the IEEE Communications Magazine and in the IEEE Journal on Selected Areas in Communications. CSIM is very active in ICC and in GLOBECOM and was one of the co-founders of MILCOM. CSIM has its roots on the Communications Systems Engineering technical committee and its past chairs are:

2021-now – Nizar Zorba

2018-2021 – Burak Kantarci

2015-2018 – Christos Verikoukis

2013-2015 – Stefano Giordano

2011-2013 – Harry Skianis

2009-2011 – Fabrizio Granelli

2007-2009 – Pascal Lorenz

2005-2007 – Nelson L.S. da Fonseca

2002-2005 – Mike Devetsikiotis

2000-2002 – Mohammad Ilyas

1999-2000 – Hussein Mouftah

1996-1999 – Guy Omydar

1994-1996 – Bill Tranter

For more information: <http://csim.committees.comsoc.org/>

2. Awards/Distinctions for CSIM members

Awards/Mentions

Claudio Fiandrino, a Post-doc Researcher at IMDEA Networks and active member of the CSIM, has been awarded **a double mobility grant, José Castillejo (ESP) and Fulbright (USA)** with the aim of promoting interpretable and trustworthy use of Artificial Intelligence (AI) in next generation 5G/6G mobile networks, and more specifically to focus on Open-RAN (O-RAN). In particular, Claudio was hosted in Tommaso Melodia's group where he studied a new solution that uses Deep Reinforcement Learning (DRL) for resource allocation in the context of network slicing and was developed with OpenRAN Gym, a unified O-RAN compliant experimental toolbox that consists of experimental wireless platforms like Colosseum, softwarized RAN, data collection and control framework and O-RAN control architecture .

3. Past Events

Distinguished Lecture by Damla Turgut (ComSoc DL – CSIM representative)

“Communication, computation, and privacy trade-off in machine learning for smart environments,” IEEE Distinguished Lecture, hosted by IEEE Egypt Section, September 15, 2022.

Past organization activities by Damla Turgut (ComSoc DL – CSIM representative)

Special Issue on “Collaborative Intelligence for Green Internet of Things in the 6G Era” in IEEE Transactions on Green Communications and Networking. To be published in December 2022. GEs: Celimuge Wu, Kok-Lim Alvin Yau, Zonghua Zhang, Shiwen Mao, Damla Turgut.

D. Turgut, IoT & Sensor Networks Symposium Co-Chair, IEEE ICC 2022, May 16-20, 2022, Seoul, South Korea

D. Turgut, Communication and Networking Symposium Co-Chair, IEEE SmartGridComm 2022, October 25-28, 2022, Singapore

4. Ongoing Research Projects/Grants

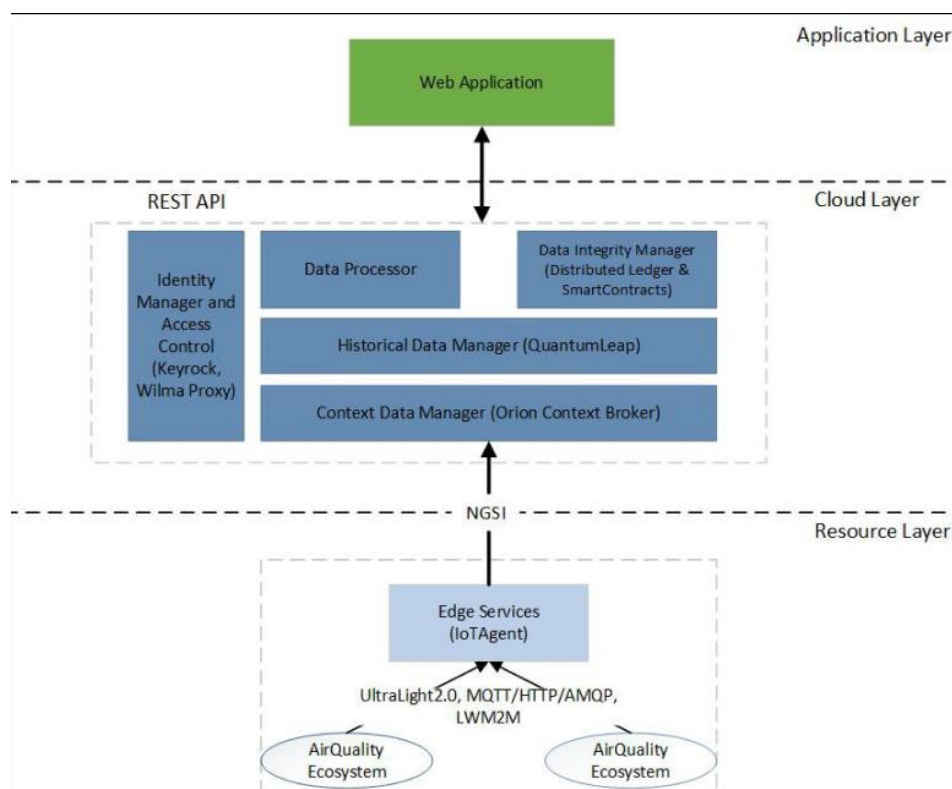
EPOPTIS: A flexible Monitoring-as-a-Service platform for IoT Networks

P. Charalampidis, N. Karamolegkos, E. Plevridi, P. Zervoudakis, A. Fragkiadakis
Institute of Computer Science, Foundation for Research and Technology-Hellas (FORTH), Greece

Contact person: Alexandros Fragkiadakis (FORTH)

Project website: <https://www.epoptis-project.gr>

EPOPTIS (This research has been financed by the European Union and Greek national funds through the Operational Program Competitiveness, Entrepreneurship and Innovation, under the call RESEARCH – CREATE – INNOVATE (project code: T1EDK-00070)) is a project that aims at the development of a secure platform which offers management-as-a-service (MaaS) for monitoring and managing heterogeneous Internet-of-Things (IoT) networks. In particular, the platform, based on FIWARE technologies, offers services for collecting, storing, processing and retrieving the IoT data in a secure way. These services provide the user with a holistic picture over the status of their IoT networks, through a web-based user interface (UI). Various parameters are being monitored across multiple layers, that include (i) monitoring statistics (e.g. link quality (RSSI), packets per second, etc.), and (ii) device specific data (e.g. battery/energy levels, temperature, humidity sensor data, etc.), which are collected through IoT gateways and devices. In the cloud backend, those parameters are being processed for rapid detection and prediction of network and device faults. The underlying technologies for the aforementioned purpose are statistical methods and blockchain. Especially, the latter, is also utilized towards data integrity protection through the use of smart contracts.



The main objectives of the EPOPTIS project are to:

- design, implement, and evaluate an interoperable and secure platform for providing Management-as-a-Service for IoT networks,
- develop data collection and visualization techniques for heterogeneous data generated by IoT devices,
- utilize statistical methods, as well as blockchain and smart contract technology, for processing collected data and automatically detecting faults in IoT networks,
- ensure data integrity protection. The overall objective of the 5G-HEART is to define and validate the cost efficient 5G converged network concepts, which enable an intelligent hub supported by multiple vertical industries.

5. Upcoming Events

International Telecommunication Networks and Applications Conference (ITNAC), Wellington, New Zealand, 30 November – 2 December 2022



Website: <https://itnac.org.au/2022/30-nov-2-dec-2022-wellington-new-zealand>

Contact Person: Mark Gregory

ITNAC 2022 is upcoming in Wellington New Zealand as a hybrid conference between 30 Nov to 2 Dec 2022.

Scope: With the increasing focus on modelling and simulation in the fields of cyber-networks, data mining, cyber security, distributed computing, mobile computing, cognitive computing, cloud computing, computing tools, applications, simulation tools, system performance and data and computer communications the demand for high quality research outcomes has never been greater. ITNAC has been the forum for researchers and engineers to present and discuss topics related to advanced computing and data communication network technologies, services and applications.

Novel contributions are presented in the form of keynote speeches by international experts, peer-reviewed technical papers, and posters. ITNAC 2022 seeks to address and capture highly innovative and state-of-the-art research from academia, industry and standardization bodies.

ITNAC 2021 is an international conference and forum for the presentation of research outcomes covering timely and relevant aspects concerning modelling and simulation of distributed, mobile, cognitive and cloud computing, computer and data communications, local and metropolitan networks, optical, wired and wireless telecommunication networks and applications. Contributions are welcome on all advanced research and particularly (but not limited to) on the following topics:

- Wireline networks
- Wireless networks
- Multi-access edge computing, Fog, Mist
- Modelling and Simulation
- Cyber-Networks, Data Mining and Cyber-Security
- Distributed, Cognitive and Cloud Computing
- Network Applications & Convergence

- Local and Metropolitan Networks
- Community and corporate Wi-Fi
- Data Communications
- Networks and Management
- Software Defined Networking
- Internet Technologies and Applications
- Emerging Technologies
- Mobility and Vehicular Networks
- Mobile Cellular and Wireless Networks
- Optical Communications
- Wireless Sensor Networks
- Power Efficiency and Sustainability

Moreover, the keynotes will be delivered by Professor Darryl Veitch IEEE Fellow University of Technology Sydney, Professor Robert Minasian IEEE Fellow University of Sydney, Professor Peter Smith Victoria University of Wellington and Associate Professor Nurul Sarkar Auckland University of Technology.

The major conference patrons are Juniper Networks and Hewlett Packard Australia.

6. Special Issues organized by CSIM members

1) Open RAN: a New Paradigm for Open, Virtualized, Programmable, and Intelligent Cellular Networks

IEEE JSAC

Contact Person: Michele Polese

Guest Editors:

- Tommaso Melodia, Institute for the Wireless Internet of Things, Northeastern University, Boston, MA, USA, melodia@northeastern.edu
- Michele Polese, Institute for the Wireless Internet of Things, Northeastern University, Boston, MA, USA, m.polese@northeastern.edu
- Rittwik Jana, Google, NJ, USA, rittwikjana@gmail.com
- Raymond Knopp, Eurecom, Sophia Antipolis, France, knopp@eurecom.fr
- Melike Erol-Kantarci, University of Ottawa and Ericsson, Ottawa, ON, CA, melike.erolkantarci@uottawa.ca
- Falko Dressler, TU Berlin, Berlin, Germany, dressler@ccs-labs.org
- Mischa Dohler, Ericsson, CA, USA, mischa.dohler@ericsson.com

Scope: The Open Radio Access Network (Open RAN) vision is based on the three principles of (i) open interfaces; (ii) cloudification; and (iii) automation through closed-loop control. It is a network architecture paradigm embodied and augmented through technical reference specifications of the 3GPP and the O-RAN Alliance. At the centre of Open RAN are open, programmable, and virtualized components, connected to each other through open interfaces that enable closed-loop, data-driven, intelligent control. For instance, the O-RAN Alliance introduced two RAN Intelligent Controllers (or RICs) that connect through open interfaces to the disaggregated components of the RAN, and implement control loops that run at different time scales.

While Open RAN networks are being deployed in trials around the world, there are still several open issues for both standardization and research, related to the design of data-driven intelligent solutions, efficient control loops, extension of open interfaces and testing, security, and use cases related to private cellular networks, non-terrestrial deployments, spectrum sharing, commercial 5G/6G networks, and evaluation and assessment of fundamental trade-offs, among others. Research in this area will shape the future development and deployment of Open RAN systems, making contributions to this JSAC Special Issue timely and relevant to the community.

This JSAC Special Issue aims at providing a comprehensive overview of fundamental research on algorithmic, architectural, and system issues, as well as on experimental aspects that substantially advance the state-of-the-art on the design of Open RAN systems. Prospective authors are invited to submit original, high-quality contributions, which comply with the IEEE JSAC editorial guidelines, in areas including, but not limited to, the following:

- Open RAN architectures and deployments
- Evolution of Open RAN Architectures and RAN Intelligent Controllers (RICs)
- Algorithms for inference and control in the Open RAN

- Machine Learning and other Artificial Intelligence techniques for the Open RAN
- Sequential decision making control techniques for closed-loop control of the RAN
- Analysis of fundamental trade-offs in Open RAN systems, including metrics such as energy efficiency, latency, overhead, cost, among others
- Federated learning for the Open RAN
- Efficient and distributed data collection paradigms
- Use cases and applications for Open RAN deployments
- Open RAN fronthaul networks and interfaces design
- Design and implementation of open source Open RAN solutions
- Security analysis of & solutions for Open RAN architectures and interfaces
- Design, testing, and evaluation of rApps, xApps, dApps for O-RAN
- RAN Intelligent Controllers
- The role of Service and Management Orchestration (SMO) in the Open RAN
- Data-driven techniques to enhance Open RAN security
- Multi-scale control of Open RAN networks
- Fundamental limits in distributed control for Open RAN networks
- Conflict mitigation in Open RAN networks
- Design and optimization of Open RAN use cases for private cellular networks
- Extension of Open RAN deployments to non-terrestrial networks
- Communication-theoretic and network-theoretic modeling and analysis of Open RAN
- Large scale Open RAN testbeds and trials
- Application acceleration for 6G use cases, including the metaverse

Important Dates:

- Paper submission deadline: November 23, 2022
- Notification for the first decision: February 15, 2023
- Acceptance notification: May 15, 2023
- Final manuscript submission deadline: July 31, 2023
- Planned publication: Fourth Quarter 2023

2) Advancements for 6G: Novel results, Testbeds and Standardization

IEEE OJCOMS

Contact Person: Nizar Zorba

Guest Editors:

- Nizar Zorba, Qatar University (Qatar)
- Tianqi Mao, Beihang University (China)
- Gunes Karabulut Kurt, Polytechnique Montréal (Canada)
- Marco Di Renzo, Centrale Supélec (France)
- Petar Popovski, Aalborg University (Denmark)

5G networks and devices are now a reality with wide deployment and spread among population, but the demand for more data rate is still booming, and will soon need for a newer generation for wireless/cellular communication, the 6G. It will be a new standard that not only provides extremely high data rates and extremely low latency,

but also will enable the “hyper-connected” paradigm that will connect users and things and support many vertical industries and applications.

6G communications will bring new challenges due to their sensitivity to scenario conditions, thereby requiring highly adaptive techniques that will adapt extremely fast, in order to guarantee the low latency and high reliability. Spectrum and resources management will be crucial within 6G in order to account for the extremely heterogeneous scenario. The networks complexity will also be unprecedented, due to the very diverse applications such as ultra-low latency requirements for critical vehicle communication, the growing demand of high positioning accuracy for location-based services, and dense heterogeneous architectures. Several emerging topics are encountered within 6G and this SI will focus on such emerging topics, and potential solutions will be presented. Researchers and engineers from academia and industry are invited to submit their recent research results and innovations, as well as new findings obtained from experimental results as well as insights on the regulatory side.

Motivated by the current trends in the field of 6G Wireless, this Special Issue targets to assemble cross-cutting and high-quality original research papers in the following areas, but not limited to:

- Novel signal processing techniques for 6G.
- Smart Antenna schemes for 6G.
- 6G communications at the Terahertz band.
- Advanced Full Duplex strategies for 6G.
- Meta-surfaces implementation at 6G.
- AI applications for 6G.
- New Quality of Service (QoS) metrics for 6G.
- Multiple Access schemes suitable to 6G.
- Dynamic spectrum access/sharing at 6G band.
- New network architectures in 6G.
- Self-organizing 6G-enabled IoT.
- Interference management at 6G.
- New security concepts within 6G.
- 6G Testbeds and Applications.
- Spectrum regulatory for 6G bands.

Submission Guidelines

Prospective authors should submit their manuscripts following the IEEE OJCOMS guidelines. Authors should submit a manuscript through Manuscript Central.

Important Dates

Manuscript Submission Deadline: 30 April 2023

Publication Date: Second Quarter 2023