IRACON Final Workshop

28 January 2020 - Louvain-la-Neuve, Belgium

# - INVITED SPEAKERS -

## Kamran Sayrafian

Kamran Sayrafian is a Senior Scientist at the Information Technology Laboratory of the National Institute of Standards and Technology (NIST) located in Maryland, USA. He is leading several strategic projects related to the application of IoT in Healthcare. Dr. Sayrafian is also an affiliate Associate Prof. of Concordia University in Montreal, Canada since 2016. His research interests include body area networks, micro energy-harvesting, mobile sensor networks and RF-based positioning. He has published over 120 conference and journal papers, and book chapters in these areas. He is a member of the Editorial Board of the IEEE Wireless Communication Magazine. Dr. Sayrafian was a major contributor to the development of the IEEE802.15.6 international standard on body area networks; and the recipient of the 2015 U.S. Department of Commerce Bronze Medal for his contributions to this field.

*Title* IoT for Health: The Communication Infrastructure for a Pervasive Healthcare Environment

*Abstract* The Internet of Things (IoT) has numerous applications in healthcare. It has the potential to create a pervasive environment for monitoring people's health and safety as well as improving how physicians deliver care to patients. A significant driver for the IoT-Health market is the increasing penetration of connected devices in healthcare. Wearable or implantable sensors have received a remarkable growth in recent years; however, a pervasive IoT-Health infrastructure is still long way from commercialization. The end-to-end health data connectivity involves the development of many technologies that should enable reliable and location-agnostic communication between a patient and a healthcare provider. In this talk, a review of cutting-edge activities in IoT-Health and a perspective on future challenges will be presented.

## Chiara Buratti

Chiara Buratti received the Ph.D. degree in electronics, computer science, and systems from the University of Bologna in 2009. Since 2011 she is Assistant Professor at the University of Bologna. Her research interests are on Internet of Things, LoRa technology, Industrial IoT. She collaborated in many European projects, such as Newcom, Newcom++, Cruise, eDiana and Wiserban. She has been Responsible of the Bologna site of the EuWIn platform developed within the NoE Newcom# and Co-Chair of the EWG-IoT of the Cost Action IRACON. She won the "2012 Intel Early Career Faculty Honor Program Award", given from Intel, Oregon, USA.

*Title* Future Internet of Things: Building Intelligent Environments

*Abstract* The talk will start with a brief introduction about the IoT research topics addressed during the COST IRACON Action, to underline the research gaps. A future perspective for building intelligent environments will be given; emphasis will be on the application of machine learning tools to IoT, with reference to transfer learning strategies, as far as on the things-to-human interactions. The rest of the talk will be dedicated to the possible future use of TeraHertz Communications for IoT applications, considering as key use case an Industrial IoT scenario.

## Ognjen Dobrijevic

Ognjen Dobrijevic is a Scientist at the ABB Corporate Research Center in Västerås, Sweden. His research interests relate to designing, implementing and managing industrial networks, currently with a focus on how to exploit 5G technologies for manufacturing and industrial automation. Ognjen had received a Ph.D. degree in electrical engineering from the University of Zagreb, Croatia.

*Title* Quo Vadis, Wireless: An Industrial Automation Perspective

*Abstract* Automation finds its application in different industries, such as power generation, mining and mineral processing industry, and manufacturing. Each of these industries puts forth a set of requirements on the supporting communication infrastructure in terms of, e.g., required performance and security. This talk will first review selected use cases from the industrial automation domain which benefit from the utilization of wireless communication. It will then present how performance-related and other requirements of these use cases are tackled by specific wireless communication technologies, with a focus on 5G.

## Moray Rumney

Moray Rumney received a BSc in EE from Heriot-Watt University in 1984. He joined Hewlett-Packard that year and has remained with the company through the transition to Agilent Technologies in 1999 and Keysight Technologies in 2015. Moray joined ETSI in 1991 and 3GPP in 1999. His recent work has focussed on OTA test methods and in particular how the dynamic spatial domain enabled by massive MIMO should be specified and tested. He was technical editor and major contributor to Agilent's book "LTE and the Evolution to 4G Wireless". Moray became an independent consultant in 2018 but still represents Keysight at 3PP RAN plenary. His recent focus has been on the growing debate about the safety of the RF radiation from mobile commutations and the way in which 5G technology changes how RF safety limits should be specified and verified.

*Title* Cellular radio mobility standards and future challenges for propagation research and radiated test methods

*Abstract* This presentation will review the status of the mobility aspects of 5G standards. One of the key differentiators between 4G and 5G is the further exploitation of the spatial domain through use of spatially dynamic signals. However, despite the publication of the 3GPP New Radio specifications in Release-15, many of the spatial challenges of operating cellular networks were not fully specified. History has shown that 3G forgot to specify a credible packet data service to match GPRS, and 4G forgot to specify a credible voice service. If 5G could be described as the Formula 1 of mobile communications then Release 15 forgot to specify a steering wheel. The Release 16 specifications are starting to address the gaps but in no way will fully specify performance in a spatially dynamic environment. In addition, technically capable and affordable test systems for spatially dynamic signals do not yet exist which adds to the difficulty in ensuring 5G lives up to its potential.

## Sílvia Ruiz Boqué

Sílvia Ruiz Boqué received the PhD degree in Telecommunication Engineering from UPC, Spain, in 1989, becoming Associate Professor at the Universitat Politecnica de Catalunya in 1992. She is the head of the Wireless Communication and Technologies Research Group, WiComTec. She is co-chairing the NET layer WG3 of the European COST Action CA15104 Inclusive Radio Communication Networks for 5G and Beyond (IRACON) Her research interests are in the field of radio communication systems, and more specifically in 5G, LTE-A and NB-IoT radio network planning and optimization.

*Title* Research challenges and technologies for future Radio Network layer

*Abstract* To investigate the Network Layer aspects that will characterise the merger of the cellular paradigm and the Internet-of-Things (IoT) architectures, in the context of the evolution towards 5G-and-beyond. This has been the goal of DWG3 in IRACON and, consequently, this is what this talk is about, including as well emerging services, scenarios and applications that will become more and more important in next years.

## Marco Di Renzo

Marco Di Renzo is a CNRS Research Director and a faculty member of CentraleSupelec and Paris-Saclay University, Paris, France. Also, he is a Nokia Foundation Visiting Professor at Aalto University. He is a Highly Cited Researcher, an IEEE Fellow, and a Distinguished Lecturer of the IEEE Communications Society (COMSOC) and IEEE Vehicular Technology Society. Currently, he serves as the Editor-in-Chief of IEEE Communications Letters. He has received several awards, including the SEE-IEEE Alain Glavieux Award, the IEEE Jack Neubauer Memorial Best Systems Paper Award, the IEEE COMSOC Young Professional in Academia Award, the IEEE COMSOC Best Young Researcher Award, and the Best Paper Award at IEEE ICC 2019.

*Title* Wireless 2.0: Wireless Networks Empowered by Reconfigurable Intelligent Surfaces

*Abstract* Recently, a new concept called reconfigurable intelligent surfaces (RISs) has emerged wherein every environmental object is coated with man-made intelligent surfaces of configurable electromagnetic materials. These materials would contain integrated electronic circuits and software that enable control of the wireless medium. With the aid of RISs, wireless networks will not be designed anymore to adapt themselves to the environment, but the environment will become part of the optimization space.
As such, RISs have the potential to fundamentally change how wireless networks are designed and usher in that hoped-for wireless future. In this talk, we introduce the concept of RIS-enabled smart radio environments.

## Tommi Jämsä

Tommi Jämsä graduated from Oulu University in 1995. He joined Elektrobit (EB) in 1993. Since then, his responsibilities have been product management, radio channel research, product development, and standardization of channel models and test methodologies. Mr. Jämsä has contributed to several scientific papers and patents, and he is also a frequent speaker in wireless conferences. Since 2006, he has contributed channel models and test methodologies to several international forums such as COST, WiMAX Forum, 3GPP, and ITU-R. He acted as a work package leader in IST-WINNER project and chaired channel modeling group in ITU-R WP5D. In 2013, he started as a Senior Manager in Research and Technology at Anite Telecoms where he was leading 5G channel modeling activities in the European METIS project until early 2015. He established a private company, Tommi Jamsa Consulting, in January 2015, and worked for Huawei Technologies in Sweden during 2015-2019. His responsibilities at Huawei Sweden were standardization, 5G channel models and OTA test methods. In January 2020, he was nominated as a Senior Expert, Intelligent Automotive Solutions, at Huawei Munich Research Center.

*Title* Radio channel modeling for automotive radar

*Abstract* Radio-wave propagation modeling for radars has been evolved over several decades from average models of received signal amplitude and Radar Cross Section (RCS) to accurate Spatial RCS including delay, angle, polarization, and micro-Doppler models. This presentation discusses the methodologies of radar propagation and channel modeling for autonomous driving scenarios, emphasizing the relationship and differences between the radar and cellular communication channel models. Multi-path/multi-ray are incorporated in the framework for either types of link, and line-of-sight (LOS) and non-LOS (NLOS) concept are employed to establish the radar channel model for multi-path propagation. For NLOS case, various potential paths are investigated. The channel impulse response models for radar target link and radar interference link are proposed, and some essential channel parameters are provided. The presentation will conclude with future challenges and opportunities of radar channel modeling.

## Maciej Muehleisen

Maciej Muehleisen received his PhD on “Voice over LTE” from RWTH Aachen University in 2015 and worked as a group leader for vehicular communication at Hamburg University of Technology (TUHH) from 2012 until 2016 focusing on highly reliable aircraft and maritime networks. He is with Ericsson Research since 2017 leading the architecture work packages of the German funded 5GNetMobil and the EU funded 5GCroCo projects on connected vehicles. He is furthermore supporting the technical coordination of Ericsson’s efforts in the 5G Automotive Association (5GAA), Automotive Edge Computing Association (AECC), and ETSI Working Group on Intelligent Traffic Systems (ETSI-ITS). His key research interest is in end-to-end design, evaluation, and approval of safety critical communication services.

*Title* Cooperative, Connected and Automated Mobility (CCAM) – Challenges and Technical Enablers

*Abstract* Some say that automated vehicles will never rely on wireless communication why others believe that all vehicles on the road can be controlled from “the cloud” for best possible driving comfort, road efficiency, and safety. Somewhere in between those extremes lies the truth and the role of wireless communication and the critically of the services it provides will for sure advance over time. Several communication technologies like 4G LTE / 5G New Radio C-V2X long-range, 4G LTE / 5G New Radio C-V2X short-range (PC5/sidelink), and ITS-G5 are available to realize CCAM as well as technical enablers like for example (Mobile) Edge Clouds ((M)EC) and Network Slicing. This talk will present some challenges of CCAM and how these communication technologies and technical enablers can be used to tackle them. Particular examples from the European 5GCroCo and the German 5GNetMobil projects will be presented.

## Klaus Witrisal

Klaus Witrisal received the Ph.D. degree (cum laude) from Delft University of Technology, Delft, The Netherlands, in 2002, and the Habilitation from Graz University of Technology in 2009. He is currently an Associate Professor at the Signal Processing and Speech Communication Laboratory (SPSC) of Graz University of Technology and head of the Christian Doppler Laboratory for Location-aware Electronic Systems. His research interests are in signal processing for wireless communications, propagation channel modeling, and positioning. Klaus Witrisal served as an associate editor of IEEE Communications Letters, co-chair of the TWG "Indoor" of the COST Action IC1004, cochair of the EWG "Localisation and Tracking" of the COST Action CA15104, leading chair of the IEEE Workshop on Advances in Network Localization and Navigation (ANLN), and TPC (co)-chair of the Workshop on Positioning, Navigation and Communication (WPNC).

*Title* Positioning for 5G Wireless Systems and the Internet-of-Things

*Abstract* Disruptive technologies proposed for 5G wireless systems and the IoT hold promise of providing unprecedented localization capabilities for a wide range of application scenarios and target environments. This talk will summarize the expected features and resulting properties of upcoming localization systems exploiting 5G and IoT technologies. It also identifies the important theoretical limitations and practical implementation challenges at hand and recommend potential paths forward towards more accurate, robust, and secure location-based services. Accurate location information is expected to play an increasingly important role in future generations of wireless communications systems. Location-awareness will support critical system properties such as scalability, efficiency and latency.