



WiSPNET 2019



IEEE Technically Co-Sponsored

2019 International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET)

21-23, March 2019

Advancing Wireless and Mobile Communications
Technologies for 2020 Information Society



Programme

hosted by

Electronics and Communication Engineering Department
SSN College of Engineering
Kalavakkam 603110
Chennai, India.



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Welcome Messages

Message from President

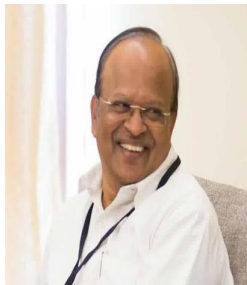


It gives me immense pleasure to greet you all for the fourth edition of WiSPNET conference held at SSN Institutions. On behalf of SSN Institutions, I extend a warm welcome to the presenters and the eminent speakers who have travelled from across the globe to be a part of WiSPNET 2019. The theme of WiSPNET 2019 is “Advancing Wireless and Mobile Communications Technologies for 2020 Information Society”. Such forward looking themes enable the rapid adoption of technologies thereby creating new possibilities. The previous versions of WiSPNET were enablers of productive and dynamic technological advancements that kept in mind its usefulness to humankind at the same time. As this paradigm takes shape, WiSPNET 2019 has moved ahead with its attention firmly on providing a platform for such ideas. The number of submissions to WiSPNET 2019, the international participants and speakers, stand as an open affirmation of the success of the conference. The overwhelming support of the technical community world over, through increased participation at this year’s WiSPNET is noteworthy. It is my hope that the contributions of the participants in the pages of this proceeding will be a vital addition to novel approaches and strategies in wireless communication, signal processing and networking.

I put on record my appreciation to the significant contributions of the host Department, the Department of Electronics and Communication and every organizing committee member for creating a novel podium for the display of technological advancements. This year’s WiSPNET has successfully triggered a ripple effect that would see the presentation of attractive and effective solutions to the large number of challenges faced in the current technological advancements. I wholeheartedly wish WiSPNET 2019 a grand success.

Kala Vijayakumar,
President, SSN Institutions

Message from General Chair



I am extremely happy that the Department of Electronics and Communication Engineering conducts the fourth edition of IEEE International Conference on “Wireless Communications, Signal Processing and Networking (WiSPNET 2019)” during 21-23 March 2019. WiSPNET has been a driving force garnering massive recognition among industry and academia alike. The conference stands out for the progressive keynotes in its agenda. The theme of this conference is “Advancing Wireless and Mobile Communications Technologies for 2020 Information Society” which is the need of the hour. This conference will be an appropriate platform for researchers to present, discuss, study and explore innovative ideas in the area of wireless communications and signal processing. At the conference, eminent speakers from leading universities across the globe will deliver keynote addresses on trending topics related to wireless communications, signal processing and networking.

For the conference, 367 technical papers including 15 international submissions were received, of which 124 papers were selected for presentation. A pioneering workshop on “Intelligent receiver for future wireless communication systems” will be an added highlight of this conference. The conference forms a perfect bridge between the academia and industry. Every keynote to be delivered will showcase invaluable contributions of this domain. The participation of industry experts at WiSPNET 2019 will enable us to understand the current demands and latest trends in the industry.

I extend my appreciation to the organizing members for devoting their time and effort in elevating the conference to the global platform. I am sure that the efforts of the organizers coupled with the dynamism of the participants and encouragement of international speakers, WiSPNET 2019 will enrich and enlighten the young and budding researchers to embrace newer and innovative advancements in the area of wireless technologies. I wish this conference a grand success.

S. Salivahanan

General Chair & Principal/SSNCE

Message from Conference Chair



It is indeed a great pleasure to welcome all of you to the fourth edition of IEEE WiSPNET, at SSN CE, Chennai, India. The birth of WiSPNET was in the year 2016. Since then WiSPNET moves forward by continuing to feature the latest in wireless communications and by exhibiting frontier research. As the Conference Chair of the 'IEEE International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET) 2019, I extend my heartiest greetings to you all.

The theme of the conference this year is "Advancing Wireless and Mobile Communications Technologies for 2020 Information Society" which is gaining focus among the researchers. The conference was conceived to primarily encourage the collaboration of research scholars and emerging researchers with the more established academic community in a comfortable setting to present and to discuss new and innovative research. WiSPNET 2019 is brought out bigger and better than its previous editions. On this momentous occasion, I sincerely thank IEEE, our technical sponsors, and I would like to bestow compliments to all partners in publications and sponsorships for their valuable support.

The success of WiSPNET 2019 largely depends on the determination, aptitude, and vigour of researchers in the field of wireless communications and signal processing who have communicated papers on a variety of innovative topics. A total of 367 submissions were received for WiSPNET 2019. Of these, 124 research papers of high publication standards are accepted to be presented in this event. There were 15 international submissions from countries like USA, UK, China, Bangladesh and Jordan. The conference has an acceptance ratio of 33.78% which is on par with the best conferences around the world.

This year's conference has been highlighted by yet another distinguished group of speakers from leading universities across the world. In addition to the contributed papers, ten invited keynote presentations have been organized. The speakers include:

- **Dr. Ian F. Akyildiz**, Georgia Institute of Technology, Director of the Broadband Wireless Networking Laboratory and Chair of the Telecommunications Group, USA
- **Dr. Ala' Khalifeh**, Electrical and Communication Engg, Jordanian University
- **Dr. Mohamed-Slim Alouini**, Professor Associate Dean, King Abdullah University of Science and Technology
- **Dr Giovanni Schembra**, Associate Professor, University of Catania
- **Dr. Kaushik R. Chowdhury**, Associate Professor, Department of Electrical and Computer Engineering, Northeastern University, Boston, USA
- **Dr. Seshaiyah Ponnekanti**, Technologist, NEC Europe Ltd, United Kingdom

- **Dr. Tolga M. Duman**, Professor, Electrical and Electronics Engineering Department, Bilkent University, Turkey
- **Dr. Sami Muhaidat**, Department of Electrical and Computer Engineering, Khalifa University, Abu Dhabi, UAE

Moreover, the conference also boasts of a technically gripping workshop on “Intelligent receiver for future wireless communication systems” moderated by **Dr. Sudhan Majhi**, Associate Professor, Dept of EE, IIT Patna. The goal of the workshop is to foster fruitful interactions among signal designers, researchers and communications practitioners from all over the world. The focus of the workshop is to overcome the spectrum crisis by implementing a blind wireless receiver (BWR) and adaptive or dynamic transceiver system.

This mammoth conference is possible due to the backing and hard work of a large number of people. My sincere thanks to the Chief Patron, Dr. Shiv Nadar, Founder, SSN Institutions & Chairman, HCL Technologies, Patron, Mrs. Kala Vijayakumar, President, SSN Institutions, Conference General Chair Dr. S Salivahanan, Principal, SSNCE, and all the faculty members from SSN College of Engineering who assisted in getting the conference off the ground. Praise is also deserved for Conference Co-Chairs Dr. R. Kishore, and Dr. N. Prabagarane, and the conference committees that have done their best to make this conference a success. I place on record my appreciation for the contributions of external reviewers who have devoted substantial time in analysing and evaluating numerous submissions in order to hold and maintain a high standard of value for this conference. Students and research scholars of the department deserve a special mention for tireless work towards the conducting of the conference. One of the goals of WiSPNET 2019 is to make path-breaking 5G and IoT technologies available to a broad audience and the published conference volume is a testimony to this fact. We wish you all an exciting conference and an unforgettable stay at SSNI. We thank you for your interest in WiSPNET 2019 and look forward to your continued contribution and attendance in the next year’s conference.

S. Radha

Conference Chair & Head of Department/ECE/SSNCE

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Speaker – Prof. Ian F. Akyildiz

Biography



Prof. Ian F. Akyildiz

Chair Professor, School of Electrical and computer engineering, Georgia Institute of Technology, Director of the Broadband wireless networking laboratory, Chair of the Telecommunication group

I.F. Akyildiz is the Ken Byers Chair Professor with the School of Electrical and Computer Engineering, Georgia Institute of Technology, Director of the Broadband Wireless Networking Laboratory and Chair of the Telecommunications Group. Dr. Akyildiz is also Megagrant winner in Russia. He is Megagrant lead researcher at the Institute for Information Transmission Problems, Kharckevich Institute, Russian Academy of Sciences in Moscow, Russia since January 2018. He is the Editor-in-Chief of Computer Networks (Elsevier) Journal since 2000 and the founding Editor-in-Chief of the Ad Hoc Networks Journal (2003) both published by Elsevier. Dr. Akyildiz is an IEEE FELLOW (1996) and an ACM FELLOW (1997). He received numerous awards from IEEE and ACM. Due to Google scholar, his papers received over 105+K citations and his h-index is 115 as of October 2018. His current research interests are in 5G Wireless Systems, TeraHertz Band Communication, Internet of xThings (x = Micro, Nano, BioNano, Underground, Underwater).

Title

10 key technologies to realize 5G wireless systems

Abstract 1

The fifth generation (5G) mobile communication networks will require a major paradigm shift to satisfy the increasing demand for higher data rates, lower network latencies, better energy efficiency, and reliable ubiquitous connectivity. With prediction of the advent of 5G systems in the near future, many efforts and revolutionary ideas have been proposed and explored around the world. The major technological breakthroughs that will bring renaissance to wireless communication networks include (1) a wireless software-defined network, (2) network function virtualization, (3) millimeter wave spectrum, (4) massive MIMO, (5) network ultra-densification, (6) big data and mobile cloud computing, (7) scalable Internet of Things, (8) device-to-device connectivity with high mobility, (9) green communications, and (10) new radio access techniques. In this talk, the state-of-the-art and the potentials of these ten enabling technologies are extensively surveyed. Furthermore, the challenges and limitations for each technology are treated in depth, while the possible solutions are highlighted.

Title

Terahertz band: Next frontier for Wireless Communications

Abstract 2

This talk provides an in-depth view of Terahertz Band (0.1–10 THz) communication, which is envisioned as a key technology to satisfy the increasing demand for higher speed wireless communication. THz Band communication will alleviate the spectrum scarcity and capacity

limitations of current wireless systems, and enable new applications both in classical networking domains as well as in novel nanoscale communication paradigms. In this paper, the device design and development challenges for THz Band are surveyed first. The limitations and possible solutions for high-speed transceiver architectures are highlighted. The challenges for the development of new ultra-broadband antennas and very large antenna arrays are explained. When the devices are finally developed, then they need to communicate in the THz band. There exist many novel communication challenges such as propagation modeling, capacity analysis, modulation schemes, and other physical and link layer solutions, in the THz band which can be seen as a new frontier in the communication research. These challenges are treated in depth in this talk explaining the existing plethora of work and what still needs to be tackled.

Title

Internet of Space Things

Abstract 3

The Internet of Things (IoT) for terrestrial deployments is a major part of the next generation 5G wireless systems. However, there are many use cases such as monitoring remote areas, terrain monitoring including North and South poles, intelligent global transport management, etc. which require a more global, scalable, flexible and resilient solution. In this talk, a novel architecture of the Internet of Space Things (IoST) is introduced stemming from the fast development and application of newly designed CubeSats with compact hybrid THz/Ku/X band frequency transceivers and antenna arrays. The proposed IoST architecture is based on THz band communication for achieving terabit-per-second throughputs among CubeSats. Furthermore, software-defined networking (SDN), and network function virtualization (NFV) have been incorporated to effectively separate the abstraction of functionalities from the hardware by decoupling the data forwarding plane from the control plane, such separation is of prime importance given the limited onboard processing on CubeSats. Additionally, key parameters in the constellation design including the coverage footprint and number of CubeSats as well as orbital planes, etc. are investigated for feasibility and deployment studies at different altitudes in the exosphere orbit (800 km and above). Through the new IoST architecture, a much broader spatial and service domain with greatly enhanced efficacy can be served than with the traditional IoT solutions.

Speaker –Prof. Mohamed-Slim Alouini

Biography



Prof. Mohamed-Slim Alouini

Professor, Associate Dean, Computer, Electrical and Mathematical Science and Engineering, King Abdullah University of Science and Technology (KAUST), Saudi Arabia

Mohamed-Slim Alouini was born in Tunis, Tunisia. He received the Ph.D. degree in Electrical Engineering from the California Institute of Technology (Caltech), Pasadena, CA, USA, in 1998. He served as a faculty member in the University of Minnesota, Minneapolis, MN, USA, then in the Texas A&M University at Qatar, Education City, Doha, Qatar before joining King Abdullah University of Science and Technology (KAUST), Thuwal, Makkah Province, Saudi Arabia as a Professor of Electrical Engineering in 2009.

Title

Addressing spectrum scarcity through hybrid optical radio frequency wireless networks (Skype keynote)

Abstract

Rapid increase in the use of wireless services over the last two decades has led the problem of the radio-frequency (RF) spectrum exhaustion. More specifically, due to this RF spectrum scarcity, additional RF bandwidth allocation, as utilized in the recent past, is not anymore a viable solution to fulfill the demand for more wireless applications and higher data rates. The talk goes first over the potential offered by optical wireless (OW) communication systems to relieve spectrum scarcity. It then summarizes some of the challenges that need to be surpassed before such kind of systems can be deployed. Finally, the talk offers two recent studies illustrating how supplementing OW networks with RF backup access points increases these networks reliability and coverage while maintaining their high capacity.

Speaker – Ala' Khalifeh

Biography



Dr. Ala' Khalifeh

*Associate Professor, Electrical and Computer Engineering
Communication Engineering Department, IEEE Secretary - general activities,
Jordan section, German Jordanian University*

Khalifeh received the prestigious Fulbright scholarship in 2005, which enabled him to pursue his PhD degree from the University Of California-Irvine USA. While pursuing his PhD degree, and due to his excellent leadership and academic merits, Dr. Khalifeh was awarded several fellowships and scholarships such as: The Center for Pervasive Communications and Computing fellowship, the Pedagogical Fellow (PF) from 2008-2009, Phi Beta Kappa (PBK) Alumni Award in 2008. As the Fulbright program aims at transferring the gained knowledge to the participating countries, in 2012, Dr. Khalifeh went back to his home country after finishing his PhD degree in order to transfer the obtained knowledge, skills, and education to the Jordanian community. Consequently, he joined the German Jordanian University (GJU) as a faculty member. During his service at GJU, he was awarded two distinguished prizes, the first one is the GJU excellence award for research, which was awarded to him in 2015, due to his contributions in applied research, while the second award entitled as GJU excellence award for industrial collaboration, which was granted to him due to his efforts in establishing connections with the industry. In 2015, Dr. Khalifeh received the Arab-American frontiers of science, engineering, and medicine fellowship. Furthermore, Dr. Khalifeh won the first prize on Queen Rania National Entrepreneurship Competition in 2016 for his applied research work, leadership and entrepreneurship skills. In addition, Dr. Khalifeh is active in voluntary and service work, as he served as the IEEE Communication Society chapter chair- Jordan section from 2014-2017, and currently he is the IEEE Secretary-General Activities, Jordan section, and the GJU IEEE student branch councilor. Furthermore, Dr. Khalifeh has been recently awarded the Young AFCEA 40 under 40 international award for his significant contributions in technical science, technology, engineering and mathematics (STEM) field by providing innovation, thought leadership, and support to the Jordanians clients and organizations using information technology (IT).

Title

Wireless power transfer: Technology, major technology implementers and its potential applications on wireless sensor networks

Abstract

Wireless Charging and Power Transfer technology is an emerging technology that has been recently explored by the researchers and industrial communities. In this technology, a far-field radio wireless signal is used to charge a harvesting circuit especially designed for that purpose. This technology has attracted many companies due to the anticipated widespread and adoption and installation of many Internet of Things (IoT) enabled devices and tools, where energy sources are limited in most cases and having an energy harvesting and charging

circuits are paramount for its operation and lifetime. Wireless Sensors are one example of these devices that will take advantage of wireless charging, since in most scenarios, these sensors are deployed on remote areas, where nodes have to recharge their batteries from renewable sources (such as solar and wind resources). Consequently, wireless charging can assist in charging these nodes, especially when other renewable resources are in vain.

In this talk, we will present a technical overview about this technology, and explore the major companies who implemented this technology and their different approaches. Furthermore, we will demonstrate our experimental evaluation and testing with PowerCast wireless charging system; a well-known US based company that is active on this field and has manufactured wireless charging evaluation boards for research and development purposes. Our experimental analysis will also explore the potential of using this technology for charging sensor nodes deployed on a typical wireless sensor network

Speaker – Tolga M. Duman

Biography



Dr. Tolga M. Duman

Professor, Electrical and Electronics Engineering Department, Bilkent University, Turkey.

Tolga M. Duman is a Professor of Electrical and Electronics Engineering Department at Bilkent University in Turkey. He received the B.S. degree from the same university in 1993, M.S. and Ph.D. degrees from Northeastern University, Boston, MA, in 1995 and 1998, respectively, all in electrical engineering. Prior to joining Bilkent University in September 2012, he has been with the Electrical Engineering Department of Arizona State University first as an Assistant Professor (1998-2004), then as an Associate Professor (2004-2008), and a Professor (after 2008). Dr. Duman's current research interests are in systems, with particular focus on communications and signal processing, including wireless and mobile communications, coding/modulation, coding for wireless communications, data storage systems and underwater acoustic communications.

Dr. Duman is a Fellow of IEEE, a recipient of the National Science Foundation CAREER Award and IEEE Third Millennium Medal. He has served as an editor for various journals and took part in many conference organization activities. He is currently the coding and information theory area editor of IEEE Trans. on Communications and the Editor-in-Chief of Elsevier's Physical Communication, and he is the TPC co-chair of IEEE PIMRC 2019.

Title

Physical layer security: Bridging the gap between theory and practice

Abstract

Providing secure communications over the physical layer with the objective of achieving secrecy without requiring a secret key has been receiving growing attention within the past decade. The majority of the existing studies in this area are from an information theoretical perspective. In this talk, we review the recent advances on physical layer security for use in wireless communication systems with a particular focus on its practical aspects. Specifically, we explore transmission techniques that use finite alphabet signalling as opposed to Gaussian inputs (which are not realizable). We explore transmit signal design algorithms for single-antenna as well as multi-antenna wiretap channels under different assumptions on the channel state information at the transmitter. Moreover, we present a review of the recent results on secure transmission with discrete signalling for various scenarios including multi-carrier transmission systems, broadcast channels with confidential messages, cognitive multiple access and relay networks. We also present an overview of practical code construction approaches for physical layer security and discuss related open problems. Finally, we go over promising future research directions both on physical layer security and other related areas that are gaining importance including data privacy.

Speaker –Kaushik R. Choudhury

Biography



Dr. Kaushik R. Choudhury,

*Associate Professor, Department of Electrical and Computer Engineering,
Northeastern University, Boston, MA*

Kaushik R. Chowdhury received the PhD degree from the Georgia Institute of Technology, Atlanta, in 2009. He is currently Associate Professor and Faculty Fellow in the Electrical and Computer Engineering Department at Northeastern University, Boston, MA. He was awarded the

Presidential Early Career Award for Scientists and Engineers (PECASE) in Jan. 2017 by President Obama, the DARPA Young Faculty Award in 2017, the Office of Naval Research Director of Research Early Career Award in 2016, and the NSF CAREER award in 2015. He received multiple best paper awards, including the IEEE INFOCOM conference in 2018, ICC conference, in 2009, '12 and '13, and ICNC conference in 2013. His works have gathered over 9700 citations. His current research interests include machine learning for radios, networking for unmanned aerial systems, wireless RF energy harvesting and IoT and in the area of intra/on-body communication. He is a co-director for the Platforms for Advanced Wireless Research project office, a joint \$100 million public-private partnership between the US National Science Foundation and a wireless industry consortium to create city-scale testing platforms.

Title

Perennially operating IOT through wireless energy transfer
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Abstract

This talk describes recent advances in designing IoT systems and protocols for contactless wireless charging using radio frequency (RF) waves. It explores the fundamental tradeoffs that exist between achieving high data and recharging rates, constructive mixing of radiated signals through beamforming, MAC protocols that allow differential data/energy access and the promise of simultaneous transfer of data over energy. We also show how the same harvesting circuits can be engineered to serve as wake-up radios, thereby allowing sensors to be activated from a deep-sleep state on-demand. For indoor scenarios, we show how energy transfer can coexist with existing WiFi standards, which also re-use the same unlicensed band. For outdoor scenarios, we present our experiences of charging and waking-up sensors purely from ambient cellular signals.

Speaker – Giovanni Schembra

Biography



Dr. Giovanni Schembra,
Associate Professor, University of Catania

Giovanni Schembra is Associate Professor at the University of Catania. From September 1991 to August 1992 he was with the Telecommunications Research Group of the Cefriel of Milan, working on traffic modelling and performance evaluation in broadband networks. He was involved in several national and EU projects. In particular, he worked for the University of Catania in the European project DOLMEN (Service Machine Development for an Open Long-term Mobile and Fixed Network Environment), and has been acting as WP leader in the NoENewcom. He has served NetSoft 2017 as general workshop co-chair and as co-chair of the First International Workshop on Smart network Technologies and Edge computing for the Tactile Internet (STET 2018), jointly held with IEEE NetSoft 2018. He is Guest Editor of the IEEE Transactions on Network and Service Management, Special Issue on “Novel techniques for managing softwarized networks”, and Guest Editor of the Journal of Sensor and Actuator Networks, Special Issue on "Softwarization at the Network Edge for the Tactile Internet"

Title

Network softwarization, virtualization, artificial intelligence, resource management and orchestration: The key enablers of the 5G ecosystem

Abstract

In the last few years, telecommunications networks are going through a strong digital transformation to provide enterprises and individuals with new heterogeneous services, each characterized by different Quality of Service (QoS) requirements. The final goal is to meet the people's demand for an increasingly digital lifestyle, focusing on services that have high requirements for bandwidth, such as high definition (HD) videos, virtual reality (VR), and augmented reality (AR), services very sensitive to latency, such as assisted and automated driving, and remote management, and services that include high requirements for connection density, such as smart city and smart agriculture.

To this aim, Telco Operators and infrastructure providers are investing a lot of money to transform their networks, in order to achieve evolution dynamics comparable with the software market behavior. The main roadmap through this goal is based on network softwarization. According to this approach, all specific hardware devices are being replaced with general-purpose servers where running both network and application functions through virtualization strategies inherited by the world of cloud computing. This process, which will be used by the upcoming 5G networks, is made possible thanks to the application of the joint SDN/NFV network paradigm. An additional paradigm that will favour the development of new services requiring ultra-low latency is multi-access edge computing (MEC). According to it, computation, storage and networking resources are placed at the edge of the network, very close to the requiring customers, in such a way to reduce traffic in the core network and

achieve very high interaction for time-critical services like, for example, manufacturing production automation, robotic surgery and autonomous driving car.

In this revolutionary scenario, one of the most innovative elements that will be introduced in 5G systems is network slicing. Network slices are logically independent network portions created on a single network infrastructure to meet diversified service requirements and provide DC-based cloud architecture to support various application scenarios. The cloud approach is planned even in the radio access network, with the so-called C-RANs (Cloud RANs). For the complexity of the new generation systems, management and orchestration, on-demand configuration, automatic network slicing service generation, maintenance, and termination for various services, will be a challenging objective for both academy and industries.

This lecture provides a snapshot of the current state of art of resource virtualization and management in 5G ecosystems, with particular focus on different hypervisors and the OpenStack framework, then moving to the description of the network softwarization process with the enabler paradigms of SDN and NFV, and ending with an overview of the main methodologies of artificial intelligence applied to network ecosystems.

Then the lecture will enter in its main part, regarding management and orchestration activities of softwarized networks, with a quick description of the ETSI MANO architecture, and the most important implementations of it, i.e. Open Baton and OSM, with an overview of the main policies that can be used for management and orchestration.

The lecture will continue with a description of the main elements of the 5G network architecture, like the radio access, the approach of sharing the same infrastructure among different service providers, and a brief introduction to the problem of service function chaining and network slice management. Presentation of some relevant use cases and application scenarios will conclude the lecture. A time slot will be reserved at the end of the lecture for questions and answers. During this time slot, interaction among attendees will be encouraged for a constructive and long-time discussion that can be continued through some social channels even after the end of the conference.

Speaker –Sami Muhaidat

Biography



Dr. Sami Muhaidat,

*Department of Electrical and Communication Engineering,
Khalifa University, Abu Dhabi, UAE*

Sami Muhaidat received the Ph.D. degree in Electrical and Computer Engineering from the University of Waterloo, Waterloo, Ontario, in 2006. From 2007 to 2008, he was an NSERC postdoctoral fellow in the Department of Electrical and Computer Engineering, University of Toronto, Canada. From 2008-2012, he was an Assistant Professor in the School of Engineering Science, Simon Fraser University, BC, Canada. He is currently an Associate Professor at Khalifa University, and a Visiting Reader (Associate Professor) in the Faculty of Engineering, University of Surrey, UK. Sami's research focuses on wireless communications, physical-layer security, IoT with emphasis on battery-less devices, and machine learning. Sami is currently an Area Editor for IEEE Transactions on Communications. He served as a Senior Editor for IEEE Communications Letters, an Editor for IEEE Transactions on Communications, and an Associate Editor for IEEE Transactions on Vehicular Technology. He is also a member of Mohammed Bin Rashid Academy of scientists

Title

Opportunistic ambient backscatter communications in RF-powered cognitive radio networks

Abstract

The exponential growth in data traffic, due to the emergence of the Internet of Things (IoT) and the increasing number of connected devices, pose challenging and stringent requirements for 5G wireless networks and beyond. These requirements include, but not limited to, high spectral and energy efficiency, low latency, and massive connectivity. A particularly interesting proposal was the development of cognitive radio (CR), which was shown to be efficient in maximizing the utilization of the spectrum due to its inherent spectrum sensing (SS) capability.

Recently, the integration of RF energy harvesting with CR networks has lead to the development of a new communication paradigm, known as RF-powered CR networks. In these networks, a CR transmitter harvests RF energy when a primary user (PU) is present, which is then used for data transmission during the idle period of the PU. This protocol is referred to it as harvest-then-transmit (HTT). A major challenge, however, is the reduction in the throughput of the Secondary network when the harvested energy is low and/or when the data transmission time is short.

More recently, Ambient Backscatter Communications (ABC) has emerged as a new communication paradigm with low power and cost requirements. In a CR network, a CR

transmitter can send data to a CR receiver by backscattering the PU signal when it is present. Clearly, the performance of ABC-based CR networks greatly depends on the availability of PU signal, which represents a key challenge, particularly, during the long idle periods. In this talk, we discuss the recent developments of ABC in the context of cognitive radio. We further discuss a new opportunistic hybrid ABC-HTT model for CR networks, coined as ABC-HTT-based CR networks. Finally, we analyze and evaluate the energy efficiency performance of the new scheme considering sensing errors under different scenarios.

Speaker –Sudhan Majhi

Biography



Dr. Sudhan Majhi,

Associate Professor, Department of EE, IIT Patna

Sudhan Majhi received the M.Tech. degree in computer science and data processing (CSDP) from Indian Institute of Technology (IIT) Kharagpur, India, in 2004, and the Ph.D. degree from Nanyang Technological University (NTU), Singapore, in 2008. He has post-doctoral experience with the University of Michigan Dearborn Dearborn, MI, USA, the Institute of Electronics and Telecommunications Rennes (IETR), France, and Nanyang Technological University, Singapore. He is currently an Associate Professor in the Department of Electrical Engineering, IIT Patna, Patna, India. He is also a fellow of Sir Visvesvaraya Young Faculty Research. He is an Editor of IEEE Transactions on Vehicular Technology Journal and Associate Editor of Circuits, Systems and Signal Processing (CSSP) – Springer. His research interest includes signal processing for wireless communication which includes blind synchronization and parameter estimation, modulation classification, cooperative communications, physical layer security, cognitive radio, NOMA, mmWAVE, D2D, V2V, and M2M communication, sequence design and coding technique, OFDM, MIMO, SC-FDMA, and MIMO-OFDM.

Title

Workshop on intelligent receiver for future wireless communication systems

Abstract

The aim of the workshop is to foster fruitful interactions among signal designers, researchers and communications practitioners from all over the world.

Challenges: Spectrum crisis has increasingly become a primary issue for future wireless communications. Despite its shortage, a huge amount of spectrum is still allocated to transmit redundant data, such as the training sequences, instead of being utilized by the users. An effective way to overcome this is to implement a blind wireless receiver (BWR) and adaptive or dynamic transceiver system.

Motivation: Theoretical studies on blind parameter estimation algorithms for signals have been carried out over the past decades. However, most of them have not been implemented and measured in order to validate their feasibility. Using NI PXI Express technology, an intelligent wireless receiver testbed based on single and multi-carrier signals has been developed. It performs the signal classification, modulation identification, parameters estimation, i.e., symbol timing offset and carrier frequency offset estimation. The workshop lecture content covers:

Design and implementation of blind wireless receiver including symbol timing offset estimation, carrier frequency offset estimation and modulation classification.

Channel modelling, characterization, and estimation.

Performance analysis of cooperative communication, secrecy capacity analysis of cooperative communication in the presence of cognitive radio.

Designing of orthogonal or near orthogonal signal for wireless communication.

Speaker –Seshaiah Ponnekanti

Biography



Dr. Seshaiah Ponnekanti

NEC Europe Limited, United Kingdom.

Dr Seshaiah Ponnekanti is currently working at NEC Europe Ltd as 5G solution architect and technologist. He received his Ph.D. in Electrical Engineering from University of Newcastle-upon-Tyne, UK in 1994. He has been working in the telecoms from early second generation networks to recent 5G technologies in various applied research and industry related project activities. He has several years of specialist experience in the product development, technical project management and domain expertise spans across End-to-End System Architectures, Operations and Strategy of 4G/5G networks. He participated in major European research programmes including TSUNAMI -Adaptive smart antennas, SUNBEAM-Reconfigurable Adaptive antennas, ROMANTIK- Ad hoc networks and WINNER - new radio access system for 4G to define the 4G air interface in the RRM area. He served in the European expert panel in the fifth framework and passionate follower of the forums including Small Cell Forum, TM Forum, SDN Forum, IoT Forum and 5G (3GPPP). Keen interest in blending architecture, business cases and service/product management in Smart Cities, IoT and Gigabit broadband. He holds patents in the area of communication systems and power control. More recently, he is working on network transformation projects covering the SDN, NFV and Security.

Title	Digitalisation and network transformation
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5G Networks are expected to deliver wide range of services to support communication between smartphone devices, machines, drones and tiny sensors. Network transformation has been envisaged as a panacea to support such diverse requirements. 5G network has been designed in an all-encompassing manner to rapidly deploy customized services to cater the needs of multiple vertical industries. Transformation covers several dimensions including multiplicity of data centres (core, edge), dynamic services, compact radio access and sensor layer. This talk will give an overview of the transformation trends witnessed in the industry coupled with advances in various key enablers resulting in a set of solutions across verticals. The approach leads to visualise toolbox approach that Service Providers may utilise to deliver digital services in the 5G era. The talk will start-off of by introducing transformation landscape and, it will continue to explore the choices available for the aforementioned Service Provider journey. The mapping between the technology developments in various domains, to the corresponding solution trends will be introduced to highlight the recent trends in the rapidly developing 5G era.

Programme Schedule

Day 1 – Thursday, 21 st March 2019	
8:00 – 9:00	Registration
9:00 – 9:30	Inauguration
9:30 – 10:30	Talk 1: Prof. Dr. Ian F. Akyildiz, Director of the Broadband Wireless Networking Laboratory and Chair of the Telecommunications Group, Atlanta, GA, USA
10:30 – 11:00	Break
11:00 – 12:00	Talk 2 : Prof. Dr. Ian F. Akyildiz, Director of the Broadband Wireless Networking Laboratory and Chair of the Telecommunications Group, Atlanta, GA, USA
12:00 – 1:30	Lunch
1:30 – 2:30	Talk 3 : Dr. Kaushik R. Chowdhury, Associate Professor, Department of Electrical and Computer Engineering, Northeastern University, Boston, MA
2:30 – 3:00	Break
3:00 – 4:00	Talk 4 : Prof. Dr. Mohamed-Slim Alouini, Professor, Associate Dean, Computer, Electrical and Mathematical Science and Engineering, King Abdullah University of Science and Technology(KAUST)
4:00 – 6:00	Presentation : Hall 1- Track1, Hall 2- Track 2, Hall 3- Track 3, Hall 4 – Track 4
Day 2 – Friday, 22 nd March 2019	
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1:30 – 2:30	Talk 7 : Prof. Dr. Giovanni Schembra, Associate Professor, University of Catania
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3:00 – 4:00	Talk 8 : Dr. Sami Muhaidat, Associate Professor, Department of Electrical and Computer Engineering, Khalifa University, Abu Dhabi, UAE
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