

Final Program

VIRTUAL

2020 IEEE 91st Vehicular Technology Conference
25 – 28 May 2019 • Antwerp, Belgium

The flagship conference of IEEE Vehicular Technology Society





*2020 91st IEEE
Vehicular Technology Conference*

Final Program



25 – 28 May 2020

Online Virtual Conference

Welcome from the General Chair

With greetings on behalf of the IEEE VTC2020-Spring Organizing Committee, I welcome you to IEEE VTC2020-Spring, and for those few who are local, to Antwerp! As you are well aware, due to the extraordinary situation produced by COVID-19, we have decided to prepare our conference in a virtual format to best keep you physically safe while still profiting from the stimulating, intellectual developments that we have in store.

Notwithstanding, communication technology today plays a critical role in our business and daily lives. Even more, it seems to be reenergized and moving ahead again at increasing pace. As we have recently observed, 5G technology has now truly taken off and we get to experience the importance of both wireless and networking technologies anew. Businesses and people have rapidly changed the way they operate and communicate with each other. This opens the door for greater potential in new research directions both by industry and by academia to address challenges that we may face in the future.

Thus, the organization of IEEE VTC2020-Spring as a virtual event will serve as a starting point for our technical discussions to continue to overcome the current difficulties during this challenging time. We will come together to focus our attention so as to inform and provide the latest research results among our community. This will be reflected in the 540+ papers, multiple keynote sessions, highly relevant tutorials, and cutting edge workshops at this conference.

The IEEE VTC event has a long and fulfilling history. Over the past many years, IEEE VTC has become well established as one of the premier conferences in the world on wireless communications. Now, IEEE VTC2020-Spring – the 91st VTC – is making digital history on its own: it will be first ever VTC to be held virtually.

Once again, welcome to our conference, and I hope you will enjoy this first ever virtual VTC!

Haris Gačanin

General Chair, IEEE VTC2020-Spring

Welcome from the TPC Co-chairs

On behalf of the Technical Program Committee, we would like to welcome you to the 91st IEEE Vehicular Technology Conference (VTC2020-Spring) that will be, for the sake of safety and health of all participants, organized in a virtual online format.

This first fully virtual edition of VTC has been able to attract an exciting technical program ranging across the latest areas of research in wireless systems and networks, connected and autonomous vehicles, both manned and unmanned, emerging trends in applications of machine learning and artificial intelligence in wireless communications, and many other emerging topics. The technical program consists of 347 outstanding papers that will be presented in 70 regular sessions as part of 12 conference tracks that comprise the IEEE VTC2020-Spring technical program. In addition, our Recent Results track attracted a large number of submissions out of which 121 high-quality contributions will be also presented, adding 25 recent results sessions to the conference program. In addition to the regular and recent results sessions, the conference will feature 12 topical workshops, 9 tutorials delivered by the leading experts in the field,

and 5 extraordinary keynote speakers, four of which come from industry while one comes from the academic domain.

We would like to use this opportunity to thank all the excellent track chairs and co-chairs of the 13 tracks. They all managed to get at least 3 reviews for each paper in a short time frame, and the decision process went extremely smoothly. We would like to thank the members of the IEEE VTC2020-Spring organizing committee for their great responsiveness and support during the entire period of technical program preparation and development.

Finally, we would like to thank the authors, who always stood by in difficult times, waiting for last-minute changes and updates for the conference organization. We hope you are proud to have your work as part of this virtual edition, and still enjoy the virtual networking. We encourage you all to maximally dive into the program, and to engage with the many experts that will gather virtually. Let's learn, interact, and enjoy!

Sofie Pollin, Dejan Vukobratovic, Osamu Muta
TPC Co-chairs, IEEE VTC2020-Spring

Welcome from the VTS President

On behalf of the IEEE Vehicular Technology Society, it is truly an honor and a pleasure to welcome all of you to our society's semi-annual flagship conference, the 2020 IEEE 91st Vehicular Technology Conference – VTC2020-Spring. The conference also marks our first ever VTC to be held virtually.

This year's Spring 2020 edition of the Vehicular Technology Conference series will provide attendees with a superb collection of technical paper presentations, tutorials, plenary talks, and workshops, all in a virtual format. With the current COVID-19 global health crisis, the VTS Board of Governors has decided to convert IEEE VTC2020-Spring in Antwerp, Belgium, to a fully virtual conference for the original date, 25 – 28 May 2020. We do realize that this formula will not allow to reproduce the professional networking environment that you are used to, but it will allow VTC2020-Spring to still attain a portion of its objectives. Please know that our thoughts are with those affected by the COVID-19 outbreak. The health and safety of our members, conference attendees, and volunteers is the utmost priority of our society.

It is always our intention to be flexible and helpful to everyone during this time of difficulty. VTS is fully supportive of IEEE's mission statement and we wish you and all people success in dealing with any local challenges you may be facing. We have thus relaxed standard requirements for onsite presentation of papers

for authors and provided some financial adjustments to the cost of conference attendance. VTS understands the fact that conferences are an important factor in publications of papers by graduate students and academics, in dissemination of new product and services by industry and government agencies, and in providing a networking platform for the profession. We therefore decided to make sure that we can still publish papers accepted in our major conferences so the students can graduate, and our researchers can register their novel ideas and outcomes.

Organizing a world-class conference event such as VTC2020-Spring in normal times involves a large and highly dedicated team of volunteers, and with the change from a physical to virtual conference that has even become more challenging. We are very thankful to everyone making this conference an outstanding success! I would like to sincerely thank General Chair Haris Gacanin, Technical Program Co-chairs Sofie Pollin, Dejan Vukobratovic, Osamu Muta, and the rest of the conference organizing team for their time, effort, dedication, and commitment for making VTC2020-Spring one of the premier "virtual" international conference events in vehicular technology!

I am looking forward to the end of pandemic and seeing all of you at VTC2020-Fall in Victoria, Canada, where we will be Connecting the Mobile World! Stay safe.

Abbas Jamalipour, *President*
IEEE Vehicular Technology Society

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Keynotes

What is Beyond 5G?

Miguel Dajer, Director, New Jersey R&D Center, Futurewei Technologies Inc

Researchers have already turned their attention to what's coming beyond the current 5G standards and have started to present visions and challenges driven by perceived deficiencies of the current 5G system and by the need to continue to advance the types of services and solutions that humanity needs over the next decade. In this talk we argue that 6G will be about Cyber-Physical Systems and the need for some fundamental changes in how we approach research by increasing the dimensionality of the solutions, and focusing not just on communications research, but as important, on other non-traditional domains needed to achieve this vision.

Miguel A. Dajer is a veteran of the telecom industry having spent the last 30+ years working in different wireless technologies at Bell Laboratories, Lucent, Alcatel-Lucent and Futurewei. Mr. Dajer is currently the USA wireless R&D VP for Futurewei Technologies and Director of the Futurewei's NJ Research Center. Mr. Dajer worked at Bell Laboratories, Lucent Technologies and Alcatel Lucent for the 25 years prior to joining Futurewei Technologies. During his tenure at the wireless labs he occupied several key positions in RAN Hardware and Software product development and life cycle management, basestation platform development, systems engineering and architecture and technology introduction of wireless products.

Since joining Futurewei, Mr. Dajer has worked towards establishing a strong wireless solutions presence in North America along with innovation and technology labs that supports the company's future technology vision. His lab research focuses on wireless technologies standardization as well as fundamental research on next generation wireless systems beyond 5G (B5G) including network architectures for the support of massive connectivity, high bandwidth and delay sensitive applications, fundamental technologies to enable these solutions, including signal processing, antenna systems, novel approaches to modem implementation for B5G and the role of big data and machine learning on wireless communication.

Envisioning Smart Mobility Society in the Connected Future

Muriel Desaeger, Technical General Manager of Technology Trend Analysis, Toyota Motor Europe, Belgium

The automotive industry is changing faster today than it has in 100 years and must reconsider what our society and customers expect from us - as automotive companies. It is not only a shift from a car manufacturing & sales company to a mobility company but also a convergence of electrification, connectivity and artificial intelligence. With these exciting advances, it is our mission to provide new mobility society. The main objectives of this session are: (1) the current state of vehicle connectivity, showing connected vehicles in major regions and how to utilize big data, and (2) our vision of the smart mobility society of the future, which is the key to realize seamless and comfortable transportation through connected vehicles with the Vehicle Control Interface and the Mobility Service Platform (MSPF).

Dr. Muriel Desaeger is currently acting as General Manager at the R&D center of Toyota Motor Europe. She is leading the Strategic Division called Technology Trends Analysis Division. This division is navigating Toyota's Research & Innovation, deliver European originated solutions using EU knowhow, networks & anticipation of trends. Scope on which the division is acting is Big Data, Connected cars, Mobility, Decarbonisation & Societal changes. Recommendations and implementation plans are managed taking into account R&D potentials, market status and customer viewpoints. She has 25 year experience with

Toyota and before acting in the current position she was General Manager of New Business Strategy, Advanced Technology Divisions and Material Engineering Division. In these positions, she developed several contacts with the European Commission, Automotive & Telecoms suppliers and also several Universities. Key focus point has always been to enhance the complementarities between European and Japanese know-how. She is graduated as Material Science Engineer of the University of Louvain-la-Neuve and got her PhD in the field of Composite Materials at the Katholieke Universiteit Leuven (Belgium).

Edge Intelligence: The Convergence of Humans, Things, and AI

Schahram Dustdar, TU Wien, Austria

Edge AI and Human Augmentation are two major technology trends, driven by recent advancements in Edge computing, IoT, and AI accelerators. As humans, things, and AI continue to grow closer together, systems engineers and researchers are faced with new and unique challenges. In this talk, we analyze the role of Edge computing and AI in the evolution of cyber-human partnerships, and identify challenges that Edge computing systems will consequently be faced with. We take a closer look at how a cyber-physical fabric will be complemented by AI operationalization to enable seamless end-to-end Edge intelligence systems.

Prof Schahram Dustdar is Full Professor of Computer Science heading the Research Division of Distributed Systems at the TU Wien, Austria. He also holds several honorary positions: Monash University in Melbourne, Shanghai University, Macquarie University in Sydney, and University of Groningen (RuG), The Netherlands (2004-2010). From Dec 2016 until Jan 2017 he was a Visiting Professor at the University of Sevilla, Spain and from January until June 2017 he was a Visiting Professor at UC Berkeley, USA. From 1999 - 2007 he worked as the co-founder and chief scientist of Caramba Labs Software AG in Vienna (acquired by Engineering NetWorld AG), a venture capital co-funded software company focused on software for collaborative processes in teams. Caramba Labs was nominated for several awards: World Technology Award in

the category of Software (2001); Top-Startup companies in Austria (Cap Gemini Ernst & Young) (2002); MERCUR Innovation award of the Austrian Chamber of Commerce (2002). He is founding co-Editor-in-Chief of the new ACM Transactions on Internet of Things (ACM TIoT) as well as Editor-in-Chief of Computing (Springer). He is an Associate Editor of IEEE Transactions on Services Computing, IEEE Transactions on Cloud Computing, ACM Transactions on the Web, and ACM Transactions on Internet Technology. Dustdar is recipient of the ACM Distinguished Scientist award (2009), the IBM Faculty Award (2012), an elected member of the Academia Europaea: The Academy of Europe, where he is chairman of the Informatics Section, as well as an IEEE Fellow (2016).

5G for the Industrial IoT – What's Next?

Andreas Mueller, *Head of Communication and Network Technology, Robert Bosch, Germany*

After years of research and standardization, 5G finally has become a reality. While it starts in a rather evolutionary manner – supporting mainly established consumer applications – it is widely believed that its true economic potential lies in the many new application domains being addressed by 5G, such as manufacturing, automotive, agriculture or healthcare. In this respect, the Industrial IoT is particularly promising as 5G may unlock unprecedented degrees of flexibility, productivity, versatility and usability in industrial production. With 3GPP Release 16, many important aspects required for the Industrial IoT have already been addressed, such as ultra-reliable low-latency communication, native support for LAN services, time-sensitive communication or non-public networks. Therefore, the research community should increasingly focus on the further evolution of 5G on the way to 6G. This keynote will give an overview of some of the remaining challenges in the context of 5G for the Industrial IoT and outline various directions for further improvements. This includes aspects like AI/ML for communications, a more holistic joint optimization of the communication system and the actual applications, new approaches to network management and finally the utilization of even higher frequency bands up to THz communication.

Dr. Andreas Mueller is the Head of Communication and Network Technology in the Corporate Research Department of Robert Bosch GmbH in Stuttgart, Germany. In addition to that, he is coordinating the industrial 5G activities of Bosch across the different business units. Andreas also serves as Chairman of the Board of the “5G Alliance for Connected Industries and Automation” (5G-ACIA), which has been established in order to make sure that 5G for the industrial domain becomes a success. This is done by providing a global forum for discussing related technical, regulatory and business aspects and by bringing all relevant stakeholders together. Andreas holds a German Diploma degree in Electrical Engineering as well as a M.Sc. degree in Information Technology, both from the University of Stuttgart, Germany. Furthermore, he received a

Ph.D. degree in Electrical Engineering from the same university (with distinction). His Ph.D. research has focused on wireless communications and particular the further development of 4G LTE towards LTE-Advanced. During this time, he also had two extended stays as a visiting researcher at the City University of Hong Kong. In 2010, he joined Rohde & Schwarz as a Systems Engineer, developing a novel software-defined radio-based communication system for the German Armed Forces. Since 2011, he has been with Bosch in various roles, always dealing with research and innovation activities. Andreas is a frequent keynote speaker at international conferences and events, an advisor to various Federal Ministries, organizations and start-ups and has been one of the early pioneers of industrial 5G.

Commercial Deployment and Future of 5G

Takehiro Nakamura, *General manager of 5G Laboratories, NTT DOCOMO, Japan*

5G commercial deployments have been started in 2019-2020, globally. NTT DOCOMO has launched Pre-5G Commercial service from September 20, 2019 in Japan and plans to launch 5G commercial service in spring of 2020. In this presentation, overviews on network deployment, services and use cases provided in the Pre-5G and to be provided in 5G commercial are explained. Studies for requirements and technologies for further evolution of 5G including 6G has been started, already, in our industry and academia. NTT DOCOMO's views and activities on these topics are also provided.

Takehiro Nakamura joined NTT Laboratories in 1990. He is now SVP and General Manager of the 5G Laboratories in NTT DOCOMO, Inc. Mr. Nakamura has been engaged in the standardization activities for the W-CDMA, HSPA, LTE/LTE-Advanced and 5G at ARIB in Japan since 1997. He has been the Acting Chairman of Strategy & Planning Committee of 5G Mobile Communications Promotion Forum(5GMF) in Japan

since October 2014. Mr. Nakamura has also been contributing to standardization activities in 3GPP since 1999, including as a contributor to 3GPP TSG-RAN as chairman from April 2009 to March 2013. He is also very active in standardization of C-V2X/Connected Car in ARIB and ITS Info-communications Forum in Japan. He is now a leader of Cellular System Task Group of ITS Info-communications Forum.

Edge Computing: The Driver Behind the Wheel of 5G-Connected Cars

Dario Sabella, *Senior Manager Standards and Research, Intel*

The talk will start from an overview of Multi-access edge computing (MEC) technology, from standards to open source and industry groups, with focus on automotive perspective. Special attention will be dedicated to Intel perspective and activities in 5GAA (5G Automotive Association), with particular reference to recent demonstration activities and delivery of predictive-QoS information through MEC, as key enabler for many advanced C-V2X services.

Dario Sabella works for Intel as Senior Manager Standards and Research, acting also as company delegate of the 5GAA (5G Automotive Association). In his role within Next Generation Standards division, Dario is driving new technologies and edge cloud innovation for the new communication systems, involved in ecosystem engagement and coordinating internal alignment on edge computing across SDOs and industry groups, in support of internal and external stakeholders/customers. In 2019 he has been appointed as ETSI MEC vice-chairman. Previously he was serving as MEC Secretary and Lead of Industry Groups, and from 2015 as Vice Chairman of ETSI MEC (Mobile Edge Computing) IEG. Prior to February 2017 he worked in TIM (Telecom Italia group), in the Wireless Access Innovation

division, as responsible in various TIM research, experimental and operational activities on OFDMA technologies (WiMAX, LTE, 5G), cloud technologies (MEC) and energy efficiency (for energy saving in TIM's mobile network). From 2006 he was involved in many international projects and technological trials with TIM's subsidiary companies (ETECSA Cuba, TIM Brasil, Telecom Argentina). Since joining TIM in 2001, he has been involved in a wide range of internal and external projects (including FP7 and H2020 EU projects), often with leadership roles. Author of several publications (40+) and patents (20+) in the field of wireless communications, radio resource management, energy efficiency and edge computing, Dario has also organized several international workshops and conferences.

Tutorials

A range of tutorials will be held given by experts from industry and academia.

T1: Computing in Communication Networks

Fabrizio Granelli, University of Trento, Italy, Frank H. P. Fitzek, Technische Universität Dresden, German

A big step lies ahead, when moving from today's 4G cellular networks to tomorrow's 5G network. Today, the network is used for content delivery, e.g. voice, video, data. Tomorrow, the 5G network (and possibly beyond that) will be fully softwarized and programmable, with new degrees of freedom. The aim of the tutorial is to illustrate how the emerging paradigms of Software Defined Networking and Network Function Virtualization will impact on the development of future systems and networks, both from the theoretical/formal as well as from the practical perspective. The tutorial will provide a comprehensive overview of the individual building blocks (software defined networking; network function virtualization; information centric networks) enabling the concept of computing in future networks, starting from use cases and concepts over technological enablers (Mininet; Docker) and future innovations (machine learning; network coding; compressed sensing) to implementing all of them on personal computers. Practical hands-on activities will be proposed, with realistic use cases to bridge theory and implementation by several examples, through the usage of a pre-built Virtual Machine (ComNetsEmu) that can be easily be extended for new experiments. The instructions to download the Virtual Machine will be provided to the attendees in advance of the event. The main objective of the tutorial will be to expose attendees to the most recent technologies in the field of networking and teach them how to use them in a real setup in the "hands-on" session. A related book written by the two presenters "Computing in Communication Networks" will be published in 2020 by Elsevier, and provide in-depth description of the concepts and hands-on activities presented in the tutorial, to enable interested attendees to learn additional details and more examples on the reviewed technologies.

Fabrizio Granelli is Associate Professor at the Dept. of Information Engineering and Computer Science (DISI) of the University of Trento (Italy). From 2012 to 2014, he was Italian Master School Coordinator in the framework of the European Institute of Innovation and Technology ICT Labs Consortium. He was Delegate for Education at DISI in 2015-2016 and he is currently member of the Executive Committee of the Trentino Wireless and Optical Testbed Lab. He was IEEE ComSoc Distinguished Lecturer for 2012-15 and IEEE ComSoc Director for Online Content in 2016-17. Prof. Granelli is IEEE ComSoc Director for Educational Services for 2018-19 and coordinator of the research and didactical activities on computer networks within the degree in Telecommunications Engineering. He was advisor of more than 80 B.Sc. and M.Sc. theses and 8 Ph.D. theses. He is author or co-author of more than 200 papers published in international journals, books and conferences in networking, with particular reference to performance modeling, cross-layering, wireless networks, cognitive radios and networks, green networking and smart grid communications.

Frank H. P. Fitzek is a Professor and chair of the communication networks group at Technische Universität Dresden coordinating the 5G Lab Germany. He received his diploma (Dipl.-Ing.) degree in electrical engineering from the University of Technology - Rheinisch-Westfälische Technische Hochschule (RWTH) - Aachen, Germany, in 1997 and his Ph.D. (Dr.-Ing.) in Electrical Engineering from the Technical University Berlin, Germany in 2002 and became Adjunct Professor at the University of Ferrara, Italy in the same year. In 2003 he joined Aalborg University as Associate Professor and later became Professor. He co-founded several start-up companies starting with acticom GmbH in Berlin in 1999. He has visited various research institutes including Massachusetts Institute of Technology (MIT), VTT, and Arizona State University. In 2005 he won the YRP award for the work on MIMO MDC and received the Young Elite Researcher Award of Denmark. He was selected to receive the NOKIA Champion Award several times in a row from 2007 to 2011. In 2008 he was awarded the Nokia Achievement Award for his work on cooperative networks. In 2011 he received the SAPEREAUDE research grant from the Danish government and in 2012 he received the Vodafone Innovation prize. His current research interests are in the areas of wireless and mobile 5G communication networks, mobile phone programming, network coding, cross layer as well as energy efficient protocol design and cooperative networking.

T2: Sensing and Communications for Vehicular Systems

Nuria Gonzalez Prelcic, University of Vigo, Spain and University of Texas, Austin, USA

Automated driving exploits multiple sensing modalities including millimeter wave radar, computer vision, not to mention wireless communication and satellite navigation. The objective of this tutorial is to provide an overview of sensing and communications in vehicular systems. The perspective taken is that of signal processing and physical layer communications. The emphasis will be placed on (1) explaining the role for communications as vehicular automation levels increase (2) describing the operations of radar, lidar, and cameras, and fusion including mention of classic algorithms and the state-of-the-art (3) describing efforts such as 5GAA and 3GPP, and technical challenges related to millimeter wave vehicular communications. There will be high level introductions to important concepts in vehicular systems coupled with specific examples of how signal processing and communication tools are used to solve key problems. References to classic work and state-of-the-art algorithms will be included to provide perspective on open problems.

Nuria Gonzalez Prelcic is an Associate Professor in the Signal Theory and Communications Department, University of Vigo, Spain (on leave) and a visiting professor at the Electrical Computing Engineering Department, The University of Texas at Austin. Her main research interests include signal processing theory and signal processing for wireless communications: filter banks, compressive sampling and estimation, multicarrier modulation, channel estimation, and MIMO processing for millimeter wave communications, including V2X at millimeter wave. In the last 4 years she has published around 70 papers in the topics of compressed sensing theory and its applications to millimeter wave and massive MIMO communications. She is and Editor for the IEEE Transactions on Wireless Communications and an Area Editor for the IEEE Signal Processing Magazine. She is a member of the IEEE Sensor Array and Multichannel Signal Processing Technical Committee. She has been the founder director of the Atlantic Research Center for Information and Communication Technologies (atlantTic) at the University of Vigo from July 2008 to January 2017. She is the assistant director of UT SAVES, a research center that addresses the challenges of wireless, networking, and sensing in vehicular systems.

T4: Drone Cellular Communications: From Theory to Real Networks

Giovanni Geraci, Universitat Pompeu Fabra, Spain

As we head towards a pervasive digital transformation aiming at more efficient, automated, and flexible processes, a growing number of tasks are being delegated to machines. Drones—a.k.a. UAVs—, the most mobile of them all, are the logical candidates to take over many such missions.

What will it take for drones—and the whole associated ecosystem—to take off? Arguably, infallible command and control channels for safe and autonomous flying, and high-throughput links for multi-purpose live video streaming. Meeting these aspirations may entail a full cellular support, provided through 5G-and-beyond hardware and software upgrades by both operators and UAV manufacturers.

Will current cellular networks suffice to meet the demanding UAV communication link requirements? Or should the operators, primarily catering to ground users, implement substantial upgrades? In this one-of-a-kind industrial tutorial, well founded answers to such—and many other—key questions will unfold as we discuss:

- Outside the classroom: a fresh look at the 3GPP standardization status, field measurements, and exciting videos of UAVs connected to existing cellular networks.
- Enabling 5G-and-beyond network-connected UAVs through massive MIMO, cell-free, and ultra-dense small cell deployments: lessons learnt and essential guidelines.
- UAV-to-UAV communications in the sky, what will it take?.

Giovanni Geraci is an Assistant Professor at UPF Barcelona (Spain), where he leads a research project on drone communications. He earned a Ph.D. from the UNSW Sydney (Australia) in 2014 and was a Research Scientist at Nokia Bell Labs (Ireland) in 2016-2018. He has co-authored 50+ IEEE publications with 1300+ citations, is co-inventor of a dozen

pending patents, and is co-editing the book "UAV Communications for 5G and Beyond" for Wiley. He has been an Editor for IEEE Trans. on Wireless Comm. and IEEE Comm. Letters, and a Workshop Co-Chair at IEEE Globecom'17, Asilomar'18, IEEE ICC'19, and IEEE ICC'20. He has been delivering a workshop keynote at IEEE PIMRC'18, an industry seminar at IEEE ICC'19, and tutorials at IEEE WCNC'18, IEEE ICC'18, IEEE Globecom'18, and IEEE PIMRC'19. He received the Best Paper Award at IEEE PIMRC'19 and the IEEE ComSoc Outstanding Young Researcher Award for EMEA Region 2018.

T5: Ambient Backscatter Communication: State-of-the-Art and Beyond

Riku Jantti, Aalto University, Finland

The Internet of Things (IoT) is now arguably one of the most heavily discussed and researched topics in the technology industry, and has the potential of completely revolutionizing how we work and how we live. Future success and sustainability of IoT depends greatly on the ability of devices to communicate using very little power without incurring additional costs or worsening our energy footprint. This issue has driven significant attention towards (ambient) backscatter communication systems, as a possible solution to leverage green IoT applications and to increase capacity for future wireless networks. This tutorial contains two parts in order to provide participants with broad and comprehensive overviews of ambient backscatter communication technology which has been considered as one of the emerging and breakthrough wireless technologies. The first half of the tutorial covers the motivation, basic principles, the state-of-the-art of (ambient) backscatter communications, and modulations schemes. The second half covers the receiver design issues, fundamental performance limits, and future works.

Riku Jantti is an Associate Professor (tenured) in Communications Engineering and the head of the Department of Communications and Networking at Aalto University School of Electrical Engineering. He received his M.Sc (with distinction) in Electrical Engineering in 1997 and D.Sc (with distinction) in Automation and Systems Technology in 2001. Prior to joining Aalto (TKK) in August 2006, he was professor pro tem at the Department of Computer Science, University of Vaasa. Currently, he still holds docentship at University of Vaasa. Prof. Jantti is a senior member of IEEE, an associate editor of IEEE Transactions on Vehicular Technology, and an IEEE Vehicular Technology Society Distinguished Lecturer (Class 2016). The research interests of Prof. Jantti include radio resource control and optimization for machine type communications, cloud based radio access networks, spectrum and co-existence management, RF Inference, ambient backscatter communication, and quantum communications.

T6: Security and Privacy for V2X Communications

Yi Qian, University of Nebraska-Lincoln, USA

In recent years, vehicular networks have been considered as a promising solution to achieve better traffic management and to improve driving experience of a driver. Vehicular networks can provide many services to facilitate road safety for vehicles and traffic management, e.g. on-road traffic information exchange and location based services. Dedicated Short Range Communications (DSRC) are specifically designed for vehicle-to-everything (V2X) communications in vehicular networks, and recently the cellular network has shown great potential to support vehicular networks with better performance and more applications. Due to the wireless nature of V2X communications, how to secure V2X communications and guarantee privacy of users are great challenges which hampered the implementation of vehicular networks. Many solutions have been proposed by researchers in last two decades. In this tutorial, we present a comprehensive survey on the state-of-the-art solutions concerning security and privacy for V2X communications. For security, detailed discussions on cryptography based schemes and trust based schemes are provided. For privacy, we summarize and compare general solutions in preserving identity privacy and location privacy. As another candidate for vehicular networks, cellular based V2X communications have shown many advantages over DSRC, and the oncoming fifth generation cellular technology are going to provide more possibilities to vehicular networks. Thus, security architectures and solutions for cellular based communications are also illustrated and discussed. Finally, we summarize the remaining challenges and point out future research directions.

Yi Qian is a professor in the Department of Electrical and Computer Engineering, University of Nebraska-Lincoln (UNL). Prior to joining UNL, he worked in the telecommunications industry, academia, and the

government. His research interests include information assurance and network security, network design, network modeling, simulation and performance analysis for next generation wireless networks, wireless ad-hoc and sensor networks, vehicular networks, smart grid communication networks, broadband satellite networks, optical networks, high-speed networks and the Internet. He is serving on the editorial board for several international journals and magazines, including serving as the Associate Editor-in-Chief for IEEE Wireless Communications Magazine. He was the Chair of IEEE Communications Society Technical Committee for Communications and Information Security 2014-2015. He is the Technical Program Committee Chair for IEEE ICC 2018. He is a Distinguished Lecturer for IEEE Vehicular Technology Society & a Distinguished Lecturer for IEEE Communications Society.

Prof. Qian received the Henry Y. Kleinkauf Family Distinguished New Faculty Teaching Award in 2011, the Holling Family Distinguished Teaching Award in 2012, the Holling Family Distinguished Teaching/Advising/Mentoring Award in 2018, and the Holling Family Distinguished Teaching Award for Innovative Use of Instructional Technology in 2018, all from University of Nebraska-Lincoln. In the recent years, he has been a frequent speaker on many topics in his research areas in various venues and forums, as a keynote speaker, a tutorial presenter, and an invited lecturer.

T7: Reinforcement Learning for Optimization of Wireless Systems: Methodology, Exploration and Optimization

Haris Gacanin, Nokia Bell Labs, Belgium

This tutorial discusses technology and opportunities to embrace artificial intelligence (AI) in the design of autonomous wireless systems. We aim to provide readers with motivation and general AI methodology of autonomous agents in the context of self-organization in real time unifying sensing, perception, reasoning and learning. We discuss differences between training-based and training-free AI methodology for both matching and dynamic problems, respectively. Finally, we introduce the conceptual functions of autonomous agent with knowledge management. Finally, a practical case study is given to illustrate the application and potential gains.

Haris Gacanin received his Dipl.-Ing. degree in Electrical engineering from University of Sarajevo, Bosnia and Herzegovina, in 2000. In 2005 and 2008, he received M.E.E. and Ph.D. from Tohoku University, Japan. He was with Tohoku University from April 2008 until May 2010 first as Japan Society for Promotion of Science postdoctoral fellow and then, as Assistant Professor. Since 2010, he is with Alcatel-Lucent (now Nokia), where he is currently Department Head at Nokia Bell Labs leading research activities related to application of artificial intelligence in network optimization with focus on physical (L1) and media access (L2) layer technologies and network architectures. He has more than 200+ publications (journals, conferences and patents) and invited/tutorial talks. He organized and hosted several tutorials and industry panels at IEEE conferences. He is VTS distinguished lecturer and senior member of the IEEE and IEICE.

T8: NOMA: Rate-Splitting and Robust Interference Management

Bruno Clerckx, Imperial College London, UK

This tutorial argues that to efficiently cope with the high throughput, reliability, heterogeneity of Quality-of-Service (QoS), and massive connectivity requirements of future multi-antenna wireless networks, multiple access and multiuser communication system design need to depart from the two extreme interference management strategies, namely fully treat interference as noise (as commonly used in 5G, MU-MIMO, CoMP, Massive MIMO, millimetre wave MIMO) and fully decode interference (as in NOMA).

In this tutorial, we depart from those two extremes and introduce the audience to a general and powerful transmission framework based on Rate-Splitting (RS). RS relies on the split of messages and the non-orthogonal transmission of common messages decoded by multiple users, and private messages decoded by their corresponding users. This enables RS to partially decode interference and partially treat the remaining interference as noise, and therefore softly bridge and reconcile the two extreme strategies of fully decode interference and treat interference as noise. As a result, RS provides a unified and flexible framework for the design and optimization of non-orthogonal transmission, multiple access, and interference management strategies.

This tutorial is dedicated to the theory, design, optimization and applications of RS and demonstrates the significant benefits in terms of spectral/energy efficiencies, reliability and robustness to Channel State Information imperfections over conventional strategies used in 5G (multi-user MIMO, massive MIMO, CoMP, mmwave MIMO) and NOMA, in a wide range of deployments, network loads (underloaded, overloaded), services (unicast, multicast) and systems (terrestrial and satellite).

The tutorial will give the audience a comprehensive introduction of the state-of-the-art development in rate splitting theory and applications in the wireless communication and signal processing society.

Bruno Clerckx is a Reader, the Head of the Wireless Communications and Signal Processing Lab, and the Deputy Head of the Communications and Signal Processing Group, within the Electrical and Electronic Engineering Department, Imperial College London, London, U.K. He received the M.S. and Ph.D. degrees in applied science from the Université Catholique de Louvain, Louvain-la-Neuve, Belgium, in 2000 and 2005, respectively. From 2006 to 2011, he was with Samsung Electronics, Suwon, South Korea, where he actively contributed to 4G (3GPP LTE/LTE-A and IEEE 802.16m) and acted as the Rapporteur for the 3GPP Coordinated Multi-Point (CoMP) Study Item. Since 2011, he has been with Imperial College London, first as a Lecturer from 2011 to 2015, then as a Senior Lecturer from 2015 to 2017, and now as a Reader. From 2014 to 2016, he also was an Associate Professor with Korea University, Seoul, South Korea. He also held various long or short-term visiting research appointments at Stanford University, EURECOM, National University of Singapore, The University of Hong Kong, Princeton University and The University of Edinburgh.

He has authored two books, 180 peer-reviewed international research papers, and 150 standards contributions, and is the inventor of 75 issued or pending patents among which 15 have been adopted in the specifications of 4G standards and are used by billions of devices worldwide. His research area is communication theory and signal processing for wireless networks. He has been a TPC member, a symposium chair, or a TPC chair of many symposia on communication theory, signal processing for communication and wireless communication for several leading international IEEE conferences. He is an Elected Member of the IEEE Signal Processing Society SPCOM Technical Committee. He served as an Editor for the IEEE Transactions On Communications from 2011 to 2015 and the IEEE Transactions on Wireless Communications from 2014 to 2018, and is currently an Editor for the IEEE Transactions on Signal Processing. He has also been a (lead) guest editor for special issues of the EURASIP Journal on Wireless Communications and Networking, IEEE Access and the IEEE Journal on Selected Areas In Communications. He was an Editor for the 3GPP LTE-Advanced Standard Technical Report on CoMP.

T9: 6G Wireless: Wireless Networks Empowered by Reconfigurable Intelligent Surfaces

Marco Di Renzo, CNRS & CentraleSupélec, France

Small cells, massive MIMO, millimeter-wave communications are three fundamental technologies that will spearhead the emergence of 5G wireless networks – Their advantages are undeniable. The question is, however, whether these technologies will be sufficient to meet the

requirements of future wireless networks that integrate communications, sensing, and computing in a single platform.

Wireless networks, in addition, are rapidly evolving towards a software-defined design paradigm, where every part of the network can be configured and controlled via software. In this optimization process, however, the wireless environment itself – the medium or channel – is generally assumed uncontrollable and often an impediment to be reckoned with. For example, signal attenuation limits the network connectivity, multi-path propagation results in fading phenomena, reflections and refractions from objects are a source of uncontrollable interference.

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. Thus, RISs enable telecommunication operators to sculpt the very medium that comprises the network. 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. But, RISs are not currently well-understood.

Marco Di Renzo was born in L'Aquila, Italy, in 1978. He received the Laurea (cum laude) and Ph.D. degrees in electrical engineering from the University of L'Aquila, Italy, in 2003 and 2007, respectively, and the Habilitation à Diriger des Recherches (Doctor of Science) degree from University Paris-Sud, France, in 2013. Since 2010, he has been with the French National Center for Scientific Research (CNRS), where he is a CNRS Research Director (CNRS Professor) in the Laboratory of Signals and Systems (L2S) of Paris-Saclay University – CNRS, CentraleSupélec, Univ Paris Sud, Paris, France. He serves as the Editor-in-Chief of IEEE Communications Letters, and as an Editor of IEEE Transactions on Communications, and IEEE Transactions on Wireless Communications. He is a Distinguished Lecturer of the IEEE Vehicular Technology Society and IEEE Communications Society, and a Senior Member of the IEEE. He is a recipient of several awards, including the 2013 IEEE-COMSOC Best Young Researcher Award for Europe, Middle East and Africa, the 2013 NoE-NEWCOM# Best Paper Award, the 2014-2015 Royal Academy of Engineering Distinguished Visiting Fellowship, the 2015 IEEE Jack Neubauer Memorial Best System Paper Award, the 2015/2018 CNRS Award for Excellence in Research and Ph.D. Supervision, the 2016 MSCA Global Fellowship (declined), the 2017 SEE-IEEE Alain Glavieux Award, the 2018 IEEE-COMSOC Young Professional in Academia Award, and 8 Best Paper Awards at IEEE conferences (2012 and 2014 IEEE CAMAD, IEEE VTC2013-Fall, 2014 IEEE ATC, 2015 IEEE ComManTel, 2017 IEEE SigTelCom, EAI 2018 INISCOM, IEEE ICC 2019). He is a highly cited researcher according to Clarivate Analytics (2019).

The following tutorials have been cancelled:

T3: Internet of Vehicles: When Edge Computing and Learning Meet Intelligent Transport Systems

Yan Zhang, University of Oslo, Norway

Workshops

W1: Terahertz Communication for Future Wireless Systems

We are now entering the beyond fifth generation (B5G) mobile communications era. It is widely agreed that B5G network should achieve greater system capacity (> 1000 times) in terms of data rate (terabits per second) and user density (the Internet of Things and Nano-Things). Also, it is generally accepted that there are three major ways to obtain several orders of increase in throughput gain, those being extreme densification of infrastructure, large quantities of new bandwidth, and a large number of antennas, allowing a throughput gain in the spatial dimension. These processes are complementary in many respects. Among others, in the search for more bandwidth beyond microwave and millimeter-wave (mmWave) systems, we are moving toward higher frequencies, especially in the promising terahertz (THz) frequency range. THz-band communication is envisioned as a key wireless technology to satisfy real-time traffic demand for mobile heterogeneous network (MHN) systems by diminishing the spectrum scarcity and capacity limitations of current wireless systems. The THz band is the spectral band that spans the frequencies between 0.1 THz and 10 THz. Although the

frequency regions immediately above and below this band (the microwaves and the far-infrared regime, respectively) have been considerably investigated, this is still one of the least explored frequency bands for MHNs, mainly due to the lack of THz technology. However, many recent advancements are enabling practical THz communications systems; thus, it is time for the wireless research community to conquer THz.

Organizer:

Kazi Huq, University of South Wales

Technical Program Committee:

Christos Politis, Kingston University

Tasos Dagiuklas, University Of Patras

Valerio Frascolla, Intel

Anwer Al-Dulaimi, EXFO

Muddesar Iqbal, London South Bank University

Jonathan Rodriguez, Instituto de Telecomunicacoes

Shahid Mumtaz, Instituto de Telecomunicacoes

Ifiok Otung, University of South Wales

Zhenyu Zhou, North China Electric Power University

Papers

1250274

1 Hybrid Precoding Techniques for THz Massive MIMO in Hotspot Network Deployment

Sherif Busari, Shahid Mumtaz, Instituto de Telecomunicacoes, Aveiro; Jonathan Rodriguez, University of South Wales

1249386

2 Indoor-to-Outdoor Path Loss Measurements in an Aircraft for Terahertz Communications

Johannes M. Eckhardt, Tobias Doeker, Thomas Kürner, Technische Universitaet Braunschweig

1249600

3 SHINE (Strategies for High-frequency Indoor Environments) with Efficient THz-AP Placement

Rohit Singh, Douglas Sicker, Carnegie Mellon University

W2: Emerging Blockchain Technology Solutions for Real-world Applications (EBTSRA)

This workshop opens a forum to present the recent research work related to blockchain-based technologies, e.g. smart contracts, threat and attack models, and incentive mechanisms. Moreover, research on other aspects inherently present in blockchain-based applications, like the Internet of Things, smart grid, e-health, logistics, etc. are also invited in this workshop.

This workshop has papers focusing on theoretical analysis, emerging applications, novel system architecture construction and design, experimental studies, and social impacts of blockchain.

General Co-chairs:

Ramesh Ramadoss, Co-Chair of IEEE Blockchain Initiative

Takuro Sato, Waseda University, Japan

Keping Yu, Waseda University, Japan

Keynote & Panel Co-chairs:

Claudio Lima, Co-Founder of Blockchain Engineering Council

Nicolas Herbaut, Paris 1 Panthéon-Sorbonne University

Publicity Co-chairs:

Keping Yu, Waseda University

Di Zhang, Zhengzhou University

TPC Co-chairs:

Andreas Veneris, University of Toronto

Min Luo, Ernst & Young

Cyril Onwubiko, Chair, IEEE UK & Ireland Blockchain Group

Zhen Wen, Waseda University

Zhenyu Zhou, North China Electric Power University

Steering Committee:

Raja Jurdak, Queensland University of Technology

Qun Jin, Waseda University

Zhong Chen, Peking University

William Zhang, Lead Security Architect of World Bank Group

Chunming Rong, Chair of IEEE CS STC on Blockchain, University of Stavanger

Papers

1249868

1 A Blockchain-based Trusted Service Mechanism for Crowdsourcing System

Tan Liang, Huan Xiao, Xinglin Shang, Sichuan Normal University; Yong Wang, University of Ottawa; Feng Ding, State University of New York Albany; Wenjuan Li, The Hong Kong Polytechnic University/Technical University of Denmark

1249232

2 A Lightweight Data Sharing Mechanism and Multi-party Computation for CPS

Zhenpeng Xu, Jian Yang, Jinyong Yin, Jiangsu Automation Research Institute

1249322

3 A Two-Tier Blockchain Architecture for the Digital Transformation of Multilateralism

Zhijun Zhang, The World Bank

1249728

4 Blockchain based Power Transaction Asynchronous Settlement System

Songpu Ai, Tsinghua University; Diankai Hu, MingByte Technology (Qingdao) Qingdao University of Technology; Tong Zhang, Shandong University; Yunpeng Jiang, MingByte Technology (Qingdao) Co., Ltd.; Chunming Rong, University of Stavanger; Junwei Cao, Tsinghua University

1249954

5 Blockchain-based Content-oriented Surveillance Network

Xin Qi, Keping Yu, Zheng Wen, San Hlaing Myint, Yutaka Katsuyama, Toshio Sato, Kiyohito Tokuda, Takuro Sato, Waseda University

W3: 1st International Workshop on Next Generation Road Weather and Air Pollution Services (NG-ROWS)

Adverse road weather conditions and air pollution are challenging for human drivers, urban population and for automated vehicles. To reach the safety, comfort and efficiency benefits of Cooperative, Connected and Automated Mobility, vehicles need to sense road conditions and see beyond the fog and/or rain wall. In addition, existing solutions for road weather services are limited in their scope and are mostly limited by: i) scalability, ii) their offline nature, and iii) high latencies. Therefore, there is the need of integrated solutions that can take the most benefits from a real-time analysis of the data gathered from weather and pollution sensing technologies and provide an on-time appropriate reaction to the end user and/or to the automated vehicles. This objective requires a higher level of intelligence to be integrated into the sensing and communication infrastructures, with decentralized aggregation and decision for robust and timely decisions to be taken.

The recent development of C-ITS standards based on a common ITS station communication architecture is an opportunity for a new generation of solutions, taking advantage of the integration of roadside units and road weather/pollution stations, vehicle' data, road weather sensors and ultimately the mobile device data from each handheld device from the road' users. Dedicated sensors embedded in vehicles can also report pollution level to build high-resolution dynamic maps accounting both weather and pollution, besides all other data already available in such maps.

Workshop Organisers:

Joaquim Ferreira, University of Aveiro and
Telecommunications Institute, Portugal

Nadjib Aitsaadi, Université de Versailles Saint-Quentin-en-
Yvelines, France

Program

Keynotes

- 1 Security In Connected Vehicle Deployments**
William Whyte, Senior Director, Technical Standards at Qualcomm
Technology Inc, USA
- 2 Vehicular Data for Real-Time Road Weather Services**
Peter Hellinckx, University of Antwerp – imec, Belgium
- 3 Upgrading Road Weather Forecasts Using Car Sensor Data**
Sylvain Watelet, with Joris Van den Bergh and Maarten Reyniers,
Royal Meteorological Institute, Belgium

Papers

1249552

- 1 Air Quality and MObility Extensible Sensor Platform**
Laurent Morin, François Bodin, IRISA - University of Rennes 1;
Benjamin Depardon, UCit; Yiannis Georgiou, Ryax Technologies;
Emilie Germetz, Neovia Innovation

1249472

- 2 Intelligent Transport Systems - Road weather information and forecast system for vehicles**
Daria Stepanova, Timo Sukuvaara, Virve Karsisto, Finnish
Meteorological Institute

1249412

- 3 PMs concentration forecasting using ARIMA algorithm**
Andreea Badicu, George Suciu, Mihaela Balanescu, Marius Dobrea,
Andrei Birdici, Oana Orza, Adrian Pasat, Beia Consult International

1249708

- 4 The Spatial Estimation of Road Surface Condition using Spatiotemporal Features**
Minwoo Lee, DTOMIC, South Korea

1250030

- 5 Towards Detection of Road Weather Conditions using Large-Scale Vehicle Fleets**
Siegfried Mercelis, University of Antwerp - imec IDLab; Sylvain Watelet, RMI; Wim Casteels, Toon Bogaerts, University of Antwerp - imec, IDLab - Faculty of Applied Engineering; Joris Van den Bergh, Maarten Reyniers, Royal Meteorological Institute of Belgium; Peter Hellinckx, University of Antwerp, Belgium

1249484

- 6 TRUST: Transportation and Road Monitoring System for Ubiquitous Real-Time Information Services**
João Almeida, João Rufino, Instituto de Telecomunicações - Aveiro;
Francisco Cardoso, Ubiwhere; Miguel Gomes, Micro I/O; Joaquim Ferreira, Instituto de Telecomunicações, Universidade de Aveiro

1249130

- 7 Using floating car data for more precise road weather forecasts**
Meike Hellweg, Karlsruhe Institute of Technology

W4: Artificial Intelligence Driven Emerging Solutions, Protocols and Technologies for Reliable, Scalable and Energy-efficient Future Generation Networks

It is expected that there will be an expansion of traffic volume due to the increased number of connected devices, i.e., 50 billion internet-connected devices by the year 2020. The fifth generation (5G) wireless communication networks is currently attracting extensive research interest from both industry and academia. It is widely agreed that in contrast to 4G, 5G should achieve 1000 times the system capacity, 10 times the spectral efficiency, higher data rates (i.e., the peak data rate of 10 Gb/s and the user experienced rate of 1Gb/s), 25 times the average cell throughput, 5 times reduction in end-to-end (E2E) latency and 100 times connectivity density. Meanwhile, International Telecommunication Union (ITU) has classified 5G services into enhanced mobile broadband (MB), ultra-reliable and low-latency communications (URLLC), and massive machine type communications (MTC) with a high variability of their performance attributes. The Exabyte flood is further complemented with the challenges of provisioning robust and reliable interconnectivity for MTCs. The demand for such machine type communication is fueled through the emerging need of all-connected societies to derive innovative transformations across various vertical sectors.

The 5G and beyond networks aims to combine several unique technological solutions such as: Higher frequency communications (mmWave), Massive MIMO systems, device/user and content centric communication, M2M communication, energy harvesting and wireless power transfer, cooperative communications and network coding. These underline key targets can be achieved via appropriate combination of these technological ingredients. These emerging areas brings the promise of enabling flexible, scalable, highly configurable and reliable network functions as well as complete solutions for future 5G mobile networks. These enabling technologies

can support massive peak data rates, however, delivering these data rates for E2E services while maintaining reliability and ultra-low-latency to support emerging applications and use cases will require rethinking all layers of the protocol stack as outlined in the recent activities of the third generation partnership project (3GPP).

Workshop Organisers:

Haris Pervaiz, Lancaster University
Muhammad Ali Imran, University of Glasgow
Christos Politis, Kingston University
Anish Jindal, Lancaster University
Deepak G C, Kingston University
Yusuf Sambo, University of Glasgow

Technical Program Committee:

Toktam Mahmoodi, Kings College London
Jonathan Rodriguez, Instituto de Telecomunicações
Ayman Radwan, Instituto de Telecomunicações
Qammer Abbasi, University of Glasgow
Zilong Liu, University of Surrey
Syed Ali Raza Zaidi, University of Leeds

Tomas Edler, Huawei

Baoyong Chi, Tsinghua University
Nikolaos Thomos, University of Essex
Mohammad Shikh-Bahaei, Kings College London
Martin Reed, University of Essex
Yang-seok Choi, Intel Corporation
Amin Maaref, Huawei
Nageen Himayat, Intel Corporation
Mohammad Mamunur Rashid, Intel Corporation
Paulo Marques, Instituto de Telecomunicações
Mahsa Derakhshani, Loughborough University
Xianbin Wang, The University of Western Ontario
Safdar H. Bouk, DGIST
Sudeep Tanwar, Nirma University
Amit Dua, BITS Pilani

Papers

1249098

1 Deep Learning Based Diversity Combining for Generic Noise and Interference

Imtiaz Ahmed, Evan Allen, Marshall University

1249050

2 Optimal Beam Separation in Auxiliary Beam Pair-based Initial Access in mmWave D2D Networks

Sadaf Nawaz, Syed Ali Hassan, NUST

1248810

3 Optimal Resource Allocation via Machine Learning in Coordinated Downlink Multi-Cell OFDM Networks under Imperfect CSI

Yunan Guo, Harbin Institute of Technology (Shenzhen); Fu-Chun Zheng, Harbin Institute of Technology (Shenzhen) & The University

of York; Jingjing Luo, Harbin Institute of Technology (Shenzhen); Xiaoming Wang, Nanjing University of Posts and Telecommunications

1250128

4 RF Fingerprinting and Deep Learning Assisted UE Positioning in 5G

M. Majid Butt, Anil Rao, Daejung Yoon, Nokia Bell Labs

1249138

5 Spectrum Occupancy Prediction Exploiting Time and Frequency Correlations Through 2D-LSTM

Mehmet Ali Ayg  l, Mahmoud Nazzal, Istanbul Medipol University; Ali Riza Ekti, Balikesir University; Ali Gorcin, Yildiz Technical University; Daniel Benevides da Costa, Federal University of Ceara (UFC); Hasan Fehmi Ate  , Huseyin Arslan, Istanbul Medipol University

W5: Technology Trials and Proof-of-Concept Activities for 5G Evolution & Beyond 5G 2020 (TPoC5GE 2020)

The 5th generation (5G) cellular communication systems are just launched in 2019. New technology concepts for the next generation mobile communications including 5G Evolution and Beyond 5G (B5G) are about to be investigated in many research entities. On top of that, research and development activities are about to be initiated. In these regards, this workshop is aiming to provide opportunities to present the latest trials and the proof-of-concept activities for next generation mobile communications. Distinguished speakers from industry as well as from academia will present their latest research and development results and will prove their perspective regarding the new directions of mobile communications. Through the discussion at the workshop, it is also expected to promote the exchange of new ideas among researchers.

Workshop Organiser:

Tomoaki Ohtsuki, Keio University

Program

Session I

Chair: Tomoaki Ohtsuki, Keio University

Keynote: 5G Evolution and Beyond

Erik Dahlman, Ericsson Research

1249662

1 Enhanced Interference Coordination and Radio Resource Management for 5G Advanced Ultra-dense RAN

Fumiyuki Adachi, Ryo Takahashi, Hidenori Matsuo, Tohoku University

1249630

2 Two Millimeter-Wave Base Station Cooperation Technologies in High-Mobility Environments for 5G Evolution

Tatsuki Okuyama, Satoshi Suyama, Nobuhide Nonaka, Yukihiro Okumura, Takahiro Asai, NTT DOCOMO, INC.

1249360

3 28 GHz-Band Experimental Trial at 283 km/h Using the Shinkansen for 5G Evolution

Nobuhide Nonaka, Kazushi Muraoka, Tatsuki Okuyama, Satoshi Suyama, Yukihiro Okumura, Takahiro Asai, NTT DOCOMO, INC.; Yoshihiro Matsumura, Central Japan Railway Company

Session II

Chair: Yukitoshi Sanada, Keio University

1248366

1 Field Experimental Evaluation on Latency and Reliability Performance of 5G NR V2V Direct Communication in Real Express Highway Environment

Manabu Mikami, Koichi Serizawa, Yoshikazu Ishida, Hideya Nishiyori, Kohei Moto, Hitoshi Yoshino, SoftBank Corp.

1248404

- 2 Field Experimental Trial of Dynamic Mode Switching for 5G NR-V2X Sidelink Communications towards Application to Truck Platooning**
Manabu Mikami, Yoshikazu Ishida, Koichi Serizawa, Kohei Moto, Hideya Nishiyori, Hitoshi Yoshino, SoftBank Corp.

1249458

- 3 Low Latency Interference Cancellation for Uplink URLLC Repetition Transmission**
Osamu Nakamura, Yasuhiro Hamaguchi, Sharp Corporation; Takumi Takahashi, Seiichi Sampei, Osaka University

1247934

- 4 Performance of FDE Using Partial LDPC Coding with Double Gray Mapping for Single-Carrier LOS-MIMO**
Kana Aono, Bin Zheng, Mamoru Sawahashi, Tokyo City University; Norifumi Kamiya, NEC Corporation

W7: Ultra-Dense Heterogeneous Wireless Networks for Beyond 5G Applications

Nowadays, the rapid growth of various wireless communication services has led to an explosion of wireless data traffic. For the beyond 5G applications, the continued progress in user companion devices equipped with advanced computational intelligence and rich communication capabilities, such as smart phones, high-end wearables, connected vehicles is required to effectively serve the exponentially growing demand in the future wireless networks. Today, in order to satisfy these requirements, the ultra-dense heterogeneous wireless networks which refers to the idea of densifying both the mobile devices and base stations (BSs), where the density of BSs may exceed that of mobile devices is one of the promising architectures. Beyond 5G wireless networks will have greatly increased density and scale compared to current networks, resulting in massive interaction between nodes. The conventional networking paradigm will be severely limited by interference in these scenarios, greatly reducing efficiency. Centralized resource and interference management approaches might cause a huge overhead. Therefore, the novel solutions are demanded in ultra-dense heterogeneous wireless networks to satisfy the traffic requirements of the extremely high number of nodes for beyond 5G applications.

Workshop Organisers:

Berna Özbek, Izmir Institute of Technology, Turkey
Alexander Pyattaev, YL-VERKOT OY, Finland

Papers

Keynote:

WPNC for Massive MIMO: Benefits and Challenges
Leila Musavian, The University of Essex, United Kingdom

1249876

- 1 End-to-End Energy Efficiency Evaluation for B5G Ultra Dense Networks**
Yu Fu, Heriot-Watt University; Mohammad Dehghani Soltani, Hamada Alshaer, University of Edinburgh; Cheng-Xiang Wang, Southeast University; Majid Safari, The University of Edinburgh; Stephen McLaughlin, Heriot-Watt University; Harald Haas, University of Edinburgh

1249772

- 2 Frequency Allocation Based on Angle-of-Arrival for Downlink User Selection in 5G MU-MIMO Heterogeneous Network**
Ahmad Fadel, IRISA

1249468

- 3 Layer division multiplexing for 5G DL transmission within ultra-dense heterogeneous networks**
Md Shantanu Islam, Mohammed N. Patwary, Roger Tait, Birmingham City University; Evtim Peytchev, Nottingham Trent University

1249450

- 4 Learning-Based Joint User-AP Association and Resource Allocation in Ultra Dense Network**
Zhipeng Cheng, Xiamen University; Minghui LiWang, University of Western Ontario; Ning Chen, Hongyue Lin, Zhibin Gao, Lianfen Huang, Xiamen University

1250016

- 5 Non-Recursive Channel Prediction for TDD Massive MIMO Systems**
Yasser Ahmed, Cairo University

1249644

- 6 Performance Analysis for NOMA with M-QAM Modulation**
Haowei Jia, Leila Musavian, University of Essex

1250032

- 7 PHY-MAC MIMO Precoder Design for Sub-6 GHz Backhaul Small Cell**
Abdellah Chehri, University of Ottawa

1249990

- 8 Variational Auto-encoders application in wireless Vehicle-to-Everything communications**
Mutasem Q. Hamdan, Khairi Hamdi, University of Manchester

W8: The 9th International Workshop on High Mobility Wireless Communications (HMWC) 2020

Future mobile communication systems aim at providing very high-rate data transmission, even under high speed scenarios such as high-speed trains and highway vehicles. High mobility results in rapidly time-varying channels, which pose significant challenges in the design of practical systems, including channel modeling, fast handover, location management, synchronization, estimation and equalization, anti-Doppler spread techniques, coding and network capacity, capacity-approaching techniques, dedicated network architectures, distributed antenna techniques etc. In addition, with the development of vehicular networks, more rigorous performance requirements (e.g., ultra-low latency and ultra-high reliability) are also required for advanced driving applications such as platooning, full automated driving, collective perception of environment and so on, which makes the research and development of wireless systems more challenging. The aim of the International Workshop on High Mobility Wireless Communications (HMWC) is to foster fruitful interactions among communication engineers, information theorists, and system designers interested in high mobility wireless communications, building successful collaborations and bridging the gap between theory and practice.

Organisers:

Pingzhi Fan, Southwest Jiaotong University
Shanzhi Chen, China Information Communication Technologies

Technical Program Committee Co-chairs:

Bo Yang, Shanghai Jiaotong University
Ning Zhang, Texas A&M University at Corpus Christi
Monica Barbara Nicoli, Politecnico di Milano

Technical Program Committee:

Giuseppe Araniti, University Mediterranea of Reggio Calabria
Baoming Bai, Xidian University
Benoît Denis, CEA
Wen Chen, Shanghai Jiao Tong University
Massimo Condoluci, Ericsson Research
Pingyi Fan, Tsinghua University
Jinling Hu, China Information Communication Technologies Group Corporation
Adlen Ksentini, EURECOM
Chengchao Liang, Carleton University

Papers

1250006

1 A Cluster-based Data Offloading Strategy for High Definition Map Application

Yunzhu Wu, Yan Shi, Zixuan Li, Beijing University of Posts and Telecommunications; Shanzhi Chen, China Academy of Telecommunication Technology (CATT)

1249790

2 A Cooperative RSU Caching Policy for Vehicular Content Delivery Networks in Two-Way Road with a T-junction

Sangsha Fang, Zahid Khan, Pingzhi Fan, Southwest Jiaotong University

1249730

3 A Decentralized Car-Sharing Control Scheme Based on Smart Contract in Internet-of-Vehicles

Qihao Zhou, Yang Zhe, Beijing University of Posts and Telecommunications; Kuan Zhang, University of Nebraska–Lincoln; Kan Zheng, Jie Liu, Beijing University of Posts and Telecommunications

1249780

4 A Distributed Driving Decision Scheme Based on Reinforcement Learning for Autonomous Driving Vehicles

Jie Liu, Long Zhao, Kan Zheng, Qihao Zhou, Beijing University of Posts and Telecommunications

1249686

5 A Semi-Distribution Congestion Control Algorithm for Event-Driven M2M Communications

Liu Yang, Southwest Jiaotong University; Heng Liu, Key Lab of Information Coding and Transmission; Pingzhi Fan, Li Hao, Cong Ouyang, Southwest Jiaotong University

1249842

6 A Sequence-based Automatic Gain Control mechanism for the Physical Channels in NR-V2X

Shilei Zheng, Rui Zhao, Li Zhao, Xiaotao Ren, Jinling Hu, China Academy of Telecommunication Technology; Yan Shi, Beijing University of Posts and Telecommunications

1249866

7 A Vehicle Density based Two-Stage Resource Management Scheme for 5G-V2X Networks

Fakhar Abbas, Gang Liu, Pingzhi Fan, Zahid Khan, Muhammad Saleh Bute, Southwest Jiaotong University

1249722

8 Analysis for Rank Distribution of BATS Codes under Time-Variant Channels

Lin Tang, Southwest Jiaotong University; Heng Liu, Key Lab of Information Coding and Transmission; Liu Yang, Zheng Ma, Southwest Jiaotong University; Ming Xiao, KTH

1249856

9 Design and Evaluation of Synchronization Signals for NR-V2X Sidelink

Jinling Hu, Xiaotao Ren, Rui Zhao, Li Zhao, Shilei Zheng, China Academy of Telecommunications Technology (CATT); Yan Shi, Beijing University of Posts and Telecommunications

Hongbin Liang, Southwest Jiaotong University

Gang Liu, Southwest Jiaotong University

Xiao Ma, Sun Yatsun University

Christian Schneider, TU Ilmenau

Daxin Tian, Beihang University

Wei Wang, Zhejiang University

Henk Wymeersch, Chalmers University of Technology

Zhaoyang Zhang, Zhejiang University

Zhengquan Zhang, Southwest Jiaotong University

Kan Zheng, Beijing University of Posts & Telecommunications

Zhijin Qin, Queen Mary University of London

1250066

10 Design of Conformance Testing System for C-V2X Standard Protocol

Yuming Ge, China Academy of Information and Communications Technology; Qinglong Xie, Chongqing University; Rundong Yu, China Academy of Information and Communications Technology; Jianchao Ma, Neusoft Corporation; Qingwen Han, Chongqing University; Qian Zhang, Neusoft Corporation

1249850

11 Double-Layer Game Based Wireless Charging Scheduling for Electric Vehicles

Tian Wang, Bo Yang, Cailian Chen, Shanghai Jiao Tong University

1249732

12 Energy Efficient Relay in UAV Networks Against Jamming: A Reinforcement Learning Based Approach

Weihang Wang, Xiaozhen Lu, Sicong Liu, Liang Xiao, Xiamen University; Bo Yang, Shanghai Jiao Tong University

1250074

13 EP-based Detection for Uplink OFDM-IDMA with Carrier Frequency Offsets

Yun Chen, Yue Xiao, University of Electronic Science and Technology of China

1249692

14 Multi-Armed Bandit Based Task Offloading By Probabilistic V2X Communication in Vehicle Edge Cloud System

Jiayou Xie, Qi Si, Tang Yuliang, Xiamen University

1249698

15 Network Selection in Heterogeneous Vehicular Network: A One-to-Many Matching Approach

Qi Si, Zhipeng Cheng, Yuhui Lin, Lianfen Huang, Tang Yuliang, Xiamen University

1249010

16 Repair Delay Performance Analysis of Mobile Caching Systems Using Erasure Codes

Wancheng Lu, Harbin Institute of Technology (Shenzhen)

1249474

17 Sensor and Map-Aided Cooperative Beam Tracking for Optical V2V Communications

Mattia Brambilla, Dario Tagliaferri, Monica Barbara Nicoli, Umberto Spagnolini, Politecnico di Milano

1249700

18 UAV-assisted Online Video Downloading in Vehicular Networks: A Reinforcement Learning Approach

Zheng Ke, Yanglong Sun, Lin Zhiping, Tang Yuliang, Xiamen University

1249726

19 Wireless Resource Pre-allocation for Cellular V2I Low-Latency Communications

Mingyu Zhang, Jianxin Zhang, Xing Tang, Tang Yuliang, University of Xiamen

W9: 6th International Workshop of CorNer: Communication for Networked Smart Cities

The aim of this workshop is to bring together a group of experts with interest in emerging smart cities related areas. The recent advancement in smart cities has boosted the development of a new generation of highly-efficient mobile networks. This workshop will highlight the recent developments in this evolving area.

Organisers:

Syed Ali Hassan, National University of Sciences and Technology, Pakistan

Dushantha Nalin K Jayakody, Tomsk Polytechnic University, Russia

Rui Dinis, Universidade Nova of Lisbon, Portugal

Technical Program Committee:

Syed Hassan Ahmed, University of Central Florida

Tadashi Matsumo, Japan Advance Institute of Science and Technology

Des McLernon, University of Leeds

Keivan Navaie, Lancaster University

Aamir Mehmood, Mid Sweden University

Ali Imran, Oklahoma University

Sajid Saleem, National University of Sciences and Technology

Muhammad Zeeshan Shakir, University of the West of Scotland

Shahid Mumtaz, Institute of Telecommunications

Adnan Kiyani, National University of Sciences and Technology

Mehdi Bennis, CWC, University of Oulu

Khalid Qaraqe, TAMUQ

Xiliang Luo, ShanghaiTech University

Hesham ElSawy, King Abdullah University of Science and Technology

Chrysostomos Chrysostomou, Frederick University

Himal A. Suraweera, University of Peradeniya

Nandana Rajethava, University of Oulu

Yonghui Li, University of Sydney

Zihuai Lin, University of Sydney

Suneth Namal Karunaratna, University of Peradeniya

Chandika Wavagedara, University of Moratuwa

Papers

1249756

1 A Cost Efficient Fair Pricing Scheme for LowEnergy Consumers of Networked Smart Cities

Syed Muhammad Mohsin, COMSATS University Islamabad, Pakistan; Nouman Ashraf, Waterford Institute of Technology; Sheraz Aslam, Cyprus University of Technology; Hassaan Khaliq Qureshi, NUST; Iqra Mustafa, Cork Institute of Technology; Muhammad Asaad Cheema, NUST; Muhammad Bilal Qureshi, SZABIST

1249716

2 An energy-aware distributed open market model for UAV-assisted communications

Rafay Iqbal Ansari, Kingston University; Nouman Ashraf, Waterford Institute of Technology; Christos Politis, Kingston University

1246998

3 Budget Feasible Roadside Unit Allocation Mechanism in Vehicular Ad-Hoc Networks

Xiaohua Xu, Kennesaw State University; Shuibing He, Zhejiang University; Meng Han, Reza M. Parizi, Kennesaw State University; Gautam Srivastava, Brandon University

1249358

4 Community-based "Piggy-back Network" utilizing Local Fixed & Mobile Resources supported by Heterogeneous Wireless & AI-based Mobility Prediction

Yozo Shoji, Wei Liu, Yoshito Watanabe, NICT

1248448

5 Coverage in Millimeter-Wave Networks with SNR-Dependent Beam Alignment Errors

Muhammad Saad Zia, Douglas M. Blough, Mary Ann Weitnauer, Georgia Institute of Technology

1251686

6 Optimization of Spreading Factor Distribution in High Density LoRa Networks

Alston Lloyed Emanuel, Xavier Fernando, Fatima Hussain, Wisam Farjow, Ryerson University

1249660

7 Quaternionic Channel-based Modulation For Dual-polarized Antennas

Sara Shakil Qureshi, Syed Ali Hassan, National University of Sciences and Technology; Sajid Ali, Jubail Industrial College

1250132

8 Resource Allocation and Throughput Maximization for IoT Real-time Applications

Rabeya Basir, Saad Qaisar, Mudassar Ali, NUST; Haris Pervaiz, Lancaster University; Muhammad Naeem, Ryerson University; Muhammad Ali Imran, University of Glasgow

1249616

9 Smart FIR: Securing e-FIR Data through Blockchain within Smart Cities

Nasir D. Khan, Chrysostomos Chrysostomou, Frederick University; Babar Nazir, COMSATS University, Pakistan

W10: 1st IEEE Workshop on Spectrum Access in Autonomous Vehicle Ecosystem (SAVE 2020)

The technical community is quickly coming to the realization that wireless connectivity is a necessary ingredient for the future of autonomous vehicles in terms of this revolutionary technology to reach the level of reliability and functionality needed to operate on public streets and highways en masse. Many of the future road applications that will be based on autonomous vehicles, such as platooning, will absolutely require wireless connectivity in order to support the control loop, sensors information sharing, and inter-car communications need to successfully achieve complex operations. However, it is unclear whether sufficient wireless spectral bandwidth exists to support these sort of communications, which could potentially require hundreds of megahertz of frequency; in the United States and other countries around the world, only 75 MHz of licensed vehicular communications spectrum exists at 5.9 GHz, which may suffer extreme channel congestion, especially with high density road traffic and significant wireless connectivity. The workshop will bring together experts in Vehicular Dynamic Spectrum Access (VDSA), experts in autonomous vehicle technology, and individuals interested in learning more about this cutting-edge topic to address a range of practical issues with respect to wireless connectivity for autonomous vehicles and provides insights on how to resolve this problems in order to create a viable VDSA network for the autonomous vehicle ecosystem.

Workshop Organisers:

Alexander Wyglinski, Worcester Polytechnic Institute

Papers

Keynote Talk

Onur Altintas, Toyota North America R&D

1250034

1 Autonomous Vehicles in Underground Mines, Where We Are, Where We Are Going?

Abdellah Chehri, University of Ottawa

1250202

2 Capacity and Coverage Analysis of High Altitude Platform (HAP) Antenna Arrays for Rural Vehicular Broadband Services

Kayode Popoola, David Grace, Tim Clarke, University of York

1249622

3 Distributed Vehicular Dynamic Spectrum Access for Platooning Environments

Pawel Sroka, Pawel Kryszkiewicz, Michal Sybis, Adrian Kliks, Poznan University of Technology; Kuldeep S. Gill, Alexander Wyglinski, Worcester Polytechnic Institute

Adrian Kliks, Poznań University of Technology

Pawel Sroka, Poznań University of Technology

Pawel Kryszkiewicz, Poznań University of Technology

1249672

4 Effects of Interference on Beamforming-Enabled Vehicular Networks in Multipath Propagation Environments

Nivetha Kanthasamy, Alexander Wyglinski, Raghendra V. Cowlagi, Worcester Polytechnic Institute

1249784

5 Influence of Sensor Inaccuracies and Acceleration Limits on IEEE 802.11p-Based CACC Controlled Platoons

Michal Sybis, Marcin Rodziewicz, Krzysztof Wesołowski, Poznan University of Technology

1248750

6 Spectrum Sensing Based on Parallel CNN-LSTM Network

Mingdong Xu, Zhendong Yin, Mingyang Wu, Zhilu Wu, Yanlong Zhao, Zhenlei Gao, Harbin Institute of Technology

W11: STRIVE 2020: Third Intl. Workshop on Safety, securiTy, and pRivacy In automotiVe systEms

The introduction of Information and Communications Technologies (ICT) systems into vehicles make them more prone to cyber-security attacks. Such attacks may impact on vehicles capability and, consequently, on the safety of drivers, passengers. Indeed, the strong integration between dedicated ICT devices, the physical environment, and the networking infrastructure, leads to consider modern vehicles as Cyber-Physical Systems. This workshop aims at providing a forum for researchers and engineers in academia and industry to foster an exchange of research results, experiences, and products in the automotive domain from both a theoretical and practical perspective. Its ultimate goal is to envision new trends and ideas about aspects of designing, implementing, and evaluating innovative solutions for the Cyber-Physical Systems with a particular focus on the new generation of vehicles. Indeed, the automotive domain presents several challenges in the fields of vehicular network, Internet of Things, Privacy, as well as, Safety and Security methods and approaches. The workshop aims at presenting the advancement on the state of art in these fields and spreading their adoption in several scenarios involving main stockholders of the automotive domain.

Workshop Organiser:

Gianpiero Costantino, Italian National Research Council

Program

Session I: Cybersecurity

Chair: Gianpiero Costantino

Opening Welcome from the Workshop Organizers

Keynote: Automotive Safety and Security Automation:

Challenges and Opportunities

Paul Duplys

1249918

1 ANTARES - Anonymous Transfer of vehicle Access Rights from External cloud Services

Adriana Berdich, Alfred Anistoroaei, Bogdan Groza, Horatiu Gurban, Stefan Murvay, Daniel Iercan, Politehnica Timisoara

1250028

2 Evaluation of Cyber Security in Digital Avionic Systems

Klaus Kainrath, Martin Fruhmann, Klaus Gebeshuber, University of Applied Sciences; Erich Leitgeb, Technical University of Graz; Mario Gruber, FH Joanneum Graz, University of Applied Sciences

1250024

3 Machine Learning for Driver Detection through CAN bus

Francesco Mercaldo, Fabio Martinelli, IIT-CNR; Antonella, Santone

Session II: Student Session

Chair: Ilaria Matteucci

1249932

1 A Physiology-based Driver Readiness Estimation Model for Tuning ISO 26262 Controllability

Moses, Roma Tre University

1249134

2 Early Analysis of Security Threats by Modeling and Simulating Power Attacks in SystemC

Josef Treus, Paula Herber, University of Münster

Closing by the Workshop Organizers

W12: Decentralized Technologies and Applications for IoT (D'IoT) 2020

The D'IoT workshop 2020 will focus on technology advancements and applications of the decentralized technologies aka blockchain for IoT and big data, including theories and applications of Big Data Analytics for IoT, Decentralized applications for Healthcare informatics under IoT, security and privacy in IoT using decentralized techniques, next generation decentralized applications for IoT, Decentralized IoT applications in Smart cities, Decentralized applications for FoG and Edge computing driven IoT, Visions on Decentralized Trustless Systems for IoT, and others. The workshop is concerned with inter-disciplinary and cross-domain studies spanning a variety of areas in computer science including

enriched IoT data management on Blockchain, mobile computing, information extraction and retrieval, and security, as well as other disciplines such as management information science.

Organisers:

Sandeep Pirbhulal, University of Beira Interior, Portugal

Wei Xiang, James Cook University, Australia

Ali Hassan Sodhro, Linköping University, Sweden

Keynote Speakers:

Nuno M. Garcia, University of Beira Interior

Azzedine Boukerche, University of Ottawa

Technical Program Committee:

Luo Zongwei, Southern University of Science and Technology

Gunasekaran Manogaran, University of California, Davis

Nuno Pombo, University of Beira Interior

Neeraj Kumar, Thapar Institute of Engineering and Technology

Muhammad Muzammal, Bahria University, Islamabad

Eshrat e alahi, Shenzhen Institute of Advanced Technology,
Chinese Academy of Sciences

Papers

1249734

- 1 **Towards QoE Optimization in Medical Multimedia Services for Decentralized IoT-based Applications**

Ali Hassan Sodhro, Linköping University

1247686

- 2 **Multithread Optimal Offloading Strategy Based on Cloud and Edge Collaboration**

Yifan Zhu, Zhaoyang Wang, Zhuo Han, Nana Li, Shouyi Yang, Zhengzhou University

1247484

- 3 **Optimal Cloud Resource Scheduling in Smart Grid: A Hierarchical Game Approach**

Hang Gao, Weiwei Xia, Feng Yan, Lianfeng Shen, Southeast University

1249008

- 4 **Degraded Read Coding Scheme in Heterogeneous Distributed Cloud Storage System for Internet of Things Data**

Xianfan Sun, Harbin Institute of Technology, Shenzhen

1249146

- 5 **LABVS: Lightweight Authentication and Batch Verification Scheme for Universal Internet of Vehicles (UIoV)**

Himani Sikarwar, Ankur Nahar, Debasis Das, Indian Institute of Technology Jodhpur Rajasthan

1249682

- 6 **Exploring Lattice-based Post-Quantum Signature for JWT Authentication: Review and Case Study**

Abdolmaged Alkhulaifi, El-Sayed M. El-Alfy, King Fahd University of Petroleum and Minerals

1250124

- 7 **Non-Cooperative Spectrum Allocation Based on Game Theory in IoT-Oriented Narrowband PLC Networks**

Abdellah Chehri, University of Ottawa

VTC2020-Spring Program

Track 1: Signal Processing for Wireless Communications

1A: 5G Networks and Systems

1245494

- 1 **A Low Complexity Baseband Signal Compression for Data Transport in LTE-A and NR Systems**

Sungyoon Cho, Joohyun Do, Inhyoung Kim, Min Goo Kim, Samsung Electronics

1250116

- 2 **Frequency and Time Spreading for Uplink URLLC Transmission**

Shang-Ho Tsai, Chia-Hsin Lai, National Chiao Tung University; Xiu-Sheng Li, MediaTek Inc.

1247562

- 3 **Interference Distribution Prediction for Link Adaptation in Ultra-Reliable Low-Latency Communications**

Alessandro Brighente, Università degli studi di Padova; Jafar Mohammadi, Paolo Baracca, Bell Labs, Nokia

1247350

- 4 **Modulated Spur Interference Cancellation for LTE-A/5G Transceivers: A System Level Analysis**

Christian Motz, Thomas Paireder, Mario Huemer, Johannes Kepler University Linz

1249798

- 5 **Pilot Spacing Adaptation in OFDM for a Flexible Next Generation Waveform**

Zaid Khan, Center for Advanced Research in Engineering; Muhammad Danish Nisar, Center for Advanced Studies in Engineering (CASE)

1B: OFDM

1249030

- 1 **Constant-Amplitude OFDM for Wireless Communication Systems**

Yuyuan CHANG, Yingqing Liu, Kazuhiko Fukawa, Tokyo Institute of Technology

1249788

- 2 **Iterative Cancellation for Inter-Block-Interference on LDPC coded MIMO-OFDM Systems**

Masakazu Kizawa, Tetsushi Ikegami, Meiji University

1249802

- 3 **Parallely Processed Peak Cancellation Signal-Based PAPR Reduction Method Using Null Space in MIMO Channel for MIMO-OFDM Signals**

Taku Suzuki, Mikihito Suzuki, Tokyo University of Science; Yoshihisa Kishiyama, NTT DOCOMO, INC.; Kenichi Higuchi, Tokyo University of Science

1250378

- 4 **Spectral Encapsulation to Block the Out-of-Band Emission of OFDM Signals for Future Communications**

Myungsup Kim, Do Young Kwak, KAIST; Ki-Man Kim, Korea Maritime and Ocean University; Wan-Jin Kim, Agency for Defence Development; Jiwon Jung, Korea Maritime and Ocean University

1C: Detection and Channel Estimation

1250224

- 1 **Expectation Maximization (EM)-based Joint Channel Estimation and Symbol Detection in Doubly Selective Block Transmission Systems**

Manjeer Majumder, IIT Kanpur; Amrita Mishra, DSPM International Institute of Information Technology; Aditya K. Jagannatham, Indian Institute of Technology Kanpur

1247490

2 Iterative Reweighed Approach for Multiuser Detection with Multiple Measurement Vector in MTC Communications

Xiaoxu Zhang, Li Hao, Pingzhi Fan, Southwest Jiaotong University; Jiaqi Liu, Linxiao Yang, University of Electronic Science and Technology of China

1244874

3 Loopback Transceiver Self-Calibration Design for Wideband RF Impairments

Juinn-Horng Deng, Chia-Fang Lee, Yuan Ze University

1247392

4 LDPC Coded Non-Recursive GMSK System with Quasi-Coherent Demodulation

Mengmeng Liu, Zhongyang Yu, Qingya Lu, B. Bai, Min Zhu, Xidian University

1248828

5 Self-interference Cancellation Utilizing Superposition Modulation Technique for Single Carrier Full-duplex System

Shuzhi Liu, Keiichi Mizutani, Kyoto University; Takeshi Matsumura, National Institute of Information and Communications Technology; Hiroshi Harada, Kyoto University

1D: Modulation and Coding

1250002

1 Differential Modulation for Buffer-Aided Cooperative Relaying using Priority-Based Link Selection

Ashish Kant Shukla, Indian Institute of Technology Delhi; Manav R Bhatnagar, IIT Delhi

1249392

2 Implementation of MCS Incorporating 1024-QAM and Beam-Based Transmission in 3D-BF

Yuji Omura, Fumiya Kemmochi, Kento Fujisawa, Hiroyuki Otsuka, Kogakuin University

1249182

3 Practical Polar Code Construction Over Memoryless Impulse Noise Channels

Der-Feng Tseng, Ying-Dai Lin, National Taiwan University of Science and Technology

1249220

4 Spinal Codes over BSC: Error Probability Analysis and the Puncturing Design

Aimin Li, Harbin Institute of Technology(Shenzhen); Shaohua Wu, Harbin Institute of Technology; Ying Wang, Jian JIAO, Harbin Institute of Technology (Shenzhen); Zhang Qinyu, Harbin Institute of Tech.

1249714

5 Soft Decision Decoding in Mud Pulse Telemetry System

Andrey Ivanov, Dmitry Lakontsev, Skolkovo Institute of Science and Technology; Alexey Fisenko, Alexander Ushakov, JSC Geomash

1E: MIMO Systems I

1246864

1 A State-space Approach for MIMO Channel Tracking in SC-FDE Transmissions

Pedro Pedrosa, Instituto de Telecomunicações; Daniel Castanheira, University of Aveiro; Adão Silva, DETI / Instituto de Telecomunicações / University of Aveiro; Rui Dinis, Universidade Nova de Lisboa; Atilio Gameiro, Universidade Aveiro

1247340

2 Non-coherent rate-splitting for multibeam satellite forward link: practical coding and decoding algorithms

Nele Noels, Ghent University/IMEC; Marc Moeneclaey, UGent; Tomás Ramírez, UVigo; Carlos Mosquera, University of Vigo, Spain; Màrius Caus, Adriano Pastore, CTTC

1248524

3 Nonlinearities Impact on Massive MIMO Millimeter Wave Hybrid Systems

Sara Teodoro, Universidade de Aveiro; Adão Silva, DETI / Instituto de Telecomunicações / University of Aveiro; Rui Dinis, Universidade Nova de Lisboa; Atilio Gameiro, Universidade Aveiro

1249906

4 Robust Non-Coherent Beamforming for FDD Downlink Massive MIMO

François Rottenberg, Ming-Chun Lee, Thomas Choi, University of Southern California; Charlie Zhang, Samsung; Andreas F. Molisch, University of Southern California

1F: MIMO Systems II

1247644

1 Damping Factor Learning of BP Detection with Node Selection in Massive MIMO using Neural Network

Junta Tachibana, Tomoaki Ohtsuki, Keio University

1248666

2 Spatial Interference Alignment Relying on Limited Precoding Matrix Feedback Indices

Steven Peng, Central China Normal University; Wei-Lv, Air Force Early Warning Academy; Liang-Zhong, China University of Geoscience; Zhengmin-Kong, Wuhan University

1248480

3 Doppler Resilient Orthogonal Time-Frequency Space (OTFS) Systems Based on Index Modulation

Yu Liang, Lingjun Li, Pingzhi Fan, Southwest Jiaotong University; Guan Yong Liang, Nanyang Technological University

1247342

4 MIMO Full-Duplex Transceiver Design In The Presence of Phase Noise

Xin Quan, Southwest Jiaotong University; Ying Liu, University of Electronic Science and Technology of China; Pingzhi Fan, SWJTU; Youxi Tang, University of Electronic Science and Technology of China

1247922

5 Transceiver Design for Large-scale DAS with Network Assisted Full Duplex

Xinjiang Xia, Pengcheng Zhu, Jiamin Li, Dongming Wang, Southeast University; Yuanxue Xin, Hohai University; Xiaohu You, Southeast University

1G: MIMO Systems III

1249456

1 Data-Aided LS Channel Estimation in Massive MIMO Turbo-Receiver

Alexander Osinsky, Andrey Ivanov, Dmitry Lakontsev, Roman Bychkov, Dmitry Yarotsky, Skolkovo Institute of Science and Technology

1249676

2 High Performance Interference Suppression in Multi-User Massive MIMO Detector

Andrey Ivanov, Alexander Osinsky, Dmitry Lakontsev, Dmitry Yarotsky, Skolkovo Institute of Science and Technology

1249298

3 High Reliability Downlink MU-MIMO: NewOSTBC Approach and Superposition Modulated Side Information

Nora Boulaïoune, Nandana Rajatheva, Matti Latva-aho, University of Oulu

1249916

4 Memory-assisted Statistically-ranked RF Beam Training Algorithms for Sparse MIMO

Krishan Kumar Tiwari, Fraunhofer IZM, Berlin; John Thompson, University of Edinburgh; Eckhard Grass, IHP, Germany and HU, Berlin

1249984

5 MIMO User Rate Balancing In Multicell Networks with Per Cell Power Constraints

Imène Ghamnia, Dirk T.M. Slock, EURECOM; Yi Yuan-Wu, Orange Labs

1249180

6 Precoder Design Algorithm using Spatial Signal Synthesis with Multiple Antenna Subset Selection for Hybrid MIMO System

Daichi Tamate, Yukitoshi Sanada, Keio University

1H: mmWave Systems I

1245886

1 A Multi-User High Accuracy Beam Training Algorithm For MmWave Communication

Quan Wan, Jun Wang, Zihan Tang, Tsinghua University

1245128

2 A novel approach to emulate and detect packet loss on surveillance radar channels

Roman Raekow, Deutsche Flugsicherung GmbH; Michael Kuhn, University of Applied Sciences Darmstadt; Bernd Ludwig Wenning, Cork Institute of Technology

1248002

3 Hybrid Precoding and Combining Algorithm for Reduced Complexity and Power Consumption Architectures in mmWave Communications

João Pedro Pavia, Nuno Souto, Marco Ribeiro, Instituto de Telecomunicações/ISCTE-IUL; João Silva, ISCTE; Rui Dinis, Universidade Nova de Lisboa

1247782

4 Impact of Wrong Beam Selection on Beam Pair Scanning Method for User Discovery in mmWave Systems

Edith Ghunney, Georgia Institute of Technology; Syed Ali Hassan, National University of Sciences and Technology; Mary Ann Weitnauer, Georgia Institute of Technology.

1248230

5 Performance Analysis of Adaptive Modulation for Millimeter Wave Cellular Systems

Khaled Humadi, Wei-Ping Zhu, Concordia University; Wessam Ajib, University of Quebec at Montreal

1I: mmWave Communications

1247944

1 A PLNC Approach for K-pair-user Exchanging in Two-Tier HetNets with mmWave Wireless Backhaul

Weixia Zou, Sixuan Chen, Beijing University of Posts and Telecommunications

1248848

2 An Initial Access Optimization Algorithm for millimeter Wave 5G NR Networks

Indika Perera, Manosha Kapuruhamy Badalge, Nandana Rajatheva, Matti Latva-aho, University of Oulu

1249550

3 Cross-Bearing based Positioning as a Feature of 5G Millimeter Wave Beam Alignment

Karsten Heimann, Janis Tiemann, Stefan Boecker, Christian Wietfeld, TU Dortmund University

1250130

4 mmWave Radar-based Hand Gesture Recognition using Range-Angle Image

Jih-Tsun Yu, Li Yen, Po-Hsuan Tseng, National Taipei University of Technology

1249674

5 Transmitter IQ Imbalance Pre-Compensation for mm-wave Hybrid Beamforming Systems

Rachit Mahendra, Saif Khan Mohammed, Ranjan K. Mallik, IIT Delhi

1J: Multicarrier Systems

1247196

1 Highly efficient TIBWB-OFDM waveform for broadband wireless communications

Filipe Conceição, Marco Gomes, Instituto de Telecomunicações - University of Coimbra; Vitor Silva, University of Coimbra; Rui Dinis, Universidade Nova de Lisboa

1247024

2 Impact of Interference on OFDM based Radars

Hasan Can Yildirim, Université Libre de Bruxelles; Jerome Louveaux, Université Catholique de Louvain; Philippe De Doncker, Francois Horlin, Université Libre de Bruxelles

1248272

3 Multiple Objective Optimization of OSBE and ISI for Cyclic Prefix Free DFT-s-OFDM Systems

Shih-Sheng Wei, Jen-Ming Wu, National Tsing Hua University

1247348

4 Pilot Allocation Based on Simulated Annealing for Sparse Channel Estimation in UWB OFDM Systems

Taoyong Li, Nele Noels, Ghent University/IMEC; Heidi Steendam, Ghent University

1244872

5 Precoder Design for Transmitter Preprocessing Aided Spatial Modulated QPSK Systems using One-bit DACs and Quantized Phase Shifters

Chiao-En Chen, National Chung Cheng University; Hsin-Ching Yang, National Chung Cheng University; Kelvin Kuang-Chi Lee, Tamkang University, New Taipei City; Yuan-Hao Huang, National Tsing Hua University

1K: Multi-Service Network Optimization

1244856

1 Optimization for Multicarrier MIMO SWIPT Systems Under MSE QoS Constraint

Xingxiang Peng, Peiran Wu, Minghua Xia, Sun Yat-sen University

1243720

2 Optimized linear precoding for biased 2-ASK modulation in multi-user SWIPT with integrated receiver

Erica Debels, Marc Moeneclaey, UGent

1244104

3 Performance of Hybrid ARQ over Power Line Communications Channels

Aashish Mathur, Indian Institute of Technology Jodhpur; Yun Ai, Michael Cheffena, Norwegian University of Science and Technology; Manav R Bhatnagar, IIT Delhi

1246636

4 Phase Retrieval via Difference of Convex Programming

Jinglian He, Min Fu, Kaiqiang Yu, Yuanming Shi, ShanghaiTech University

1246956

5 Power allocation for BER minimization in an uplink MUSA scenario

Wissal Ben Ameer, Orange; Philippe Mary, INSA Rennes; Marion Dumay, Orange; Jean-François Helard, INSA Rennes; Jean Schwoerer, Orange Labs

1L: NOMA Systems I

1247682

1 A Fading Prediction method using DL-OFDM signals for Precise TPC in TDD-UL-NOMA systems

Masafumi Moriyama, Kenichi Takizawa, Hayato Tezuka, Fumihide Kojima, National Institute of Information and Communications Technology

1247570

2 Capacity Characterization of Uplink NOMA in Multi-UAV Networks

Ernest Tan, A.S. Madhukumar, Rajendra Prasad Sirigina, Nanyang Technological University; Anoop Kumar Krishna, Airbus Group Singapore Pte Ltd

1247556

3 Complexity Reduction of MPA Detection Using Joint IQ Factor Graph in SCMA

Hiroyuki Hirama, Takahiko Saba, Chiba Institute of Technology

1247572

4 Impact of Cellular Interference on Uplink UAV Communications

Ernest Tan, A.S. Madhukumar, Rajendra Prasad Sirigina, Nanyang Technological University; Anoop Kumar Krishna, Airbus Group Singapore Pte Ltd

1248904

5 MU-MIMO NOMA with Linear Precoding Techniques in Indoor Downlink VLC Systems

Virendra Singh Rajput, Ashok D. R., A. Chockalingam, Indian Institute of Science, Bangalore

1M: NOMA Systems II

1247732

1 An antenna switching based NOMA scheme for IEEE 802.15.4 concurrent transmission

Xianjun Jiao, Muhammad Aslam, Wei Liu, Ingrid Moerman, Ghent University - imec

1245138

2 Multiuser Detector based on Fused Amended Orthogonal Matching Pursuit and Subspace Pursuit Algorithms for Uplink Grant-Free NOMA Wireless Communication Systems

Olutayo O. Oyerinde, University of the Witwatersrand

1248558

3 On the Receiver Design for Nonlinear NOMA-OFDM Systems

João Guerreiro, Universidade Autónoma de Lisboa, Instituto de Telecomunicações; Rui Dinis, Universidade Nova de Lisboa; Paulo Carvalho, FCT- Universidade Nova de Lisboa; Miguel Campos, PDM FC

1247410

4 Outage Analysis of Cooperative NOMA for Millimeter Wave Vehicular Networks at Intersections

Baha Eddine Youcef Belmekki, IRIT/ENSEEIH; Abdelkrim Hamza, USTHB; Benoit Escrig, Université de Toulouse

1247078

5 A Low-Complexity Interference Cancellation Approach for NOMA

Prasanna Herath, Afshin Haghighat, InterDigital Communications Corporation; Loïc Canonne-Velasquez, InterDigital Canada

1N: NOMA Systems III

1249072

1 Improvement of EVM for Downlink NOMA with Blind Nonlinear Compensation Scheme

Jun Nagai, Tomoki Abe, Yasushi Yamao, The University of Electro-Communications

1248938

2 Non-Orthogonal Frequency Division Multiple Access

Tongyang Xu, Izzat Darwazeh, University College London

1248992

3 On Optimal Power Control for Sequential NOMA in Wireless Relay Networks

Rung-Hung Gau, Hsiao-Ting Chiu, National Chiao Tung University

1250078

4 Optimal Precoder Design and Power Allocation for NOMA-based mmWave Downlink

Kali Krishna Kota, P. Ubaidulla, International Institute of Information Technology (IIIT), Hyderabad

1249770

5 Performance Analysis of Downlink NOMA System over α - η - μ Generalized Fading Channel

Adel Alqahtani, Emad Al-Susa, Manchester University

1O: NOMA Systems IV

1249430

1 Link-level Performance Evaluation of an UL-NOMA system with TDD constructed by hardware

Hayato Tezuka, Masafumi Moriyama, Kenichi Takizawa, nict; Fumihide Kojima, National Institute of Information and Communications Technology

1249086

2 Maximizing Connection Density in NB-IoT Networks with NOMA

Shashwat Mishra, Indian Institute of Technology, Madras, India; Lou Salaun, Nokia Bell Labs; Chung Shue Chen, Bell Labs, Nokia

1249804

3 NOMA-Based Inter-Base Station Cooperative Scheduling Method Among Multiple Service Channels to Maximize Integrated System Throughput

Teruaki Shikuma, Tokyo University of Science; Yasuaki Yuda, Panasonic Corporation; Kenichi Higuchi, Tokyo University of Science

1P: Signal Processing I

1247902

1 Atomic Norm-Based DOA Estimation in Inconsistent MIMO Radar

Peng Chen, Southeast University; Zhimin Chen, Shanghai Dianji University; Zhenxin Cao, Southeast University; Yi Jin, Xi'an branch of China Academy of Space Technology

1245658

2 A WFRFT-based Cyclic Prefix-Free Hybrid-Carrier FDE scheme

Lin Mei, Xiaojie Fang, Xu Lin, Zejia Shi, Jiaqi Wang, Harbin Institute of Technology

1246584

3 Collaborative Localization with Truth Discovery for Heterogeneous and Dynamic Vehicular Networks

Fuxi Wen, Tommy Svensson, Chalmers University of Technology

1246838

4 CompFi: Partially Connected Neural Network Using Complex CSI Data for Indoor Localization

Minseuk Kim, Changjun Kim, Dongsoo Han, June-Koo Kevin Rhee, KAIST

1247326

5 Sub-GHz Phase-Based Ranging System: Implementation and Evaluation

Masayoshi Oshiro, Shoji Ootaka, Hiroshi Yoshida, Toshiba Electronic Devices & Storage Corp

1Q: Signal Processing II

1246818

1 Fast Simulation of Ultra-Reliable Coded Communication System via Adaptive Shaping of Noise Histogram

You-Zong Yu, David Lin, National Chiao Tung University

1247412

2 On the Outage Probability of Vehicular Communications at Intersections Over Nakagami-m Fading Channels

Baha Eddine Youcef Belmekki, IRIT/ENSEEIH; Abdelkrim Hamza, USTHB; Benoit Escrig, Université de Toulouse

1247574

3 Outage Probability Analysis of the Relay Network with Correlated Relaying Channels

Trung-Hien Nguyen, Université libre de Bruxelles; Jerome Louveaux, Université Catholique de Louvain; Philippe De Doncker, Francois Horlin, Université Libre de Bruxelles

1250038

4 Rate Maximization under Partial CSIT for Multi-Stage/Hybrid BF under Limited Dynamic Range for OFDM Full-Duplex Systems

Christo Kurisummoottil Thomas, Dirk T.M. Stock, EURECOM

1247958

5 Robust Clipping Noise Cancellation Based on Location-Aware Compressed Sensing

Xudong Zhang, Yu Zhang, Xiaohua Chang, Yichen Wu, Changyong Pan, Tsinghua University

1R: Signal Processing III

1247868

1 Thresholding Quantizer Design for Mutual Information Maximization Under Output Constraint

Thuan Nguyen, Thinh Nguyen, Oregon State University

1247564

2 Adaptive Demodulation in Symmetric Alpha-Stable Impulse Noise Channels

Kristoffer Häggglund, Erik Axell, Swedish Defence Research Agency

1247544

3 Improved Parallel Sequence Spread Spectrum Transmission for High Bandwidth Efficiency

Elias L. Peter, Wolfgang Endemann, Rüdiger Kays, TU Dortmund University

1248086

4 Memory Decoding Algorithm for FSO Transmission

Yu-Jung Chu, Thinh Nguyen, Oregon State University

1248072

5 On Thresholding Quantizer Design for Mutual Information Maximization: Optimality Structures and Algorithms

Thuan Nguyen, Thinh Nguyen, Oregon State University

1S: Signal Processing IV

1248850

1 A New Approach for Accurate Time Synchronization Using Chirp Signals

Ana Belen Martinez, Atul Kumar, Technische Universität Dresden; Marwa Chaffi, ENSEA, ETIS; Gerhard Fettweis, Technische Universität Dresden

1248840

2 A Novel Power Weighted Multipath Component Clustering Algorithm Based on Spectral Clustering

Mingtao Hu, Yuxin Ye, Ruisi He, Bo Ai, Chen Huang, Zhangdui Zhong, Beijing Jiaotong University

1249278

3 Carrier Frequency Offset Estimation in Burst-Type CPM via the EM Algorithm

Andreas Lang, Berthold Lankl, Bundeswehr University Munich

1248030

4 Generalized Flight Delay Prediction Method Using Gradient Boosting Decision Tree

Fan Liu, Jinlong Sun, Miao Liu, Jie Yang, Guan Gui, Nanjing University of Posts and Telecommunications

1249800

5 Signal Restoration for Clipped Space-Frequency Index Modulation Systems

Rui Cao, Xia Lei, Yue Xiao, University of Electronic Science and Technology of China

1249530

6 SLAM using LTE Multipath Component Delays

Junshi Chen, Lund University; Meifang Zhu, Terranet AB; Fredrik Tufvesson, Lund University

1248886

7 Sparse Delay-Doppler Channel Estimation in Rapidly Time-Varying Channels for Multiuser OTFS on the Uplink

Rasheed O K, G. D. Surabhi, A Chockalingam, Indian Institute of Science, Bangalore

Track 2: Applications of Artificial Intelligence with Machine Learning

2A: Localization Techniques I

1248090

1 Indoor Localization Using Channel State Information With Regression Artificial Neural Networks

Mohsen Samadani, Polytechnique Montreal

1247220

2 CSI-based Positioning in Massive MIMO systems using Convolutional Neural Networks

Sibren De Bast, Andrea P. Guevara, Sofie Pollin, KU Leuven

1245168

3 Building Floor Identification Method Based on DAE-LSTM in Cellular Network

Yongliang Zhang, Lin Ma, Bin Wang, Harbin Institute of Technology; Danyang Qin, Heilongjiang University

1246992

4 Feed-Forward Neural Network for Network Intrusion Detection

Arnaud Rosay, STMicroelectronics; Florent Carlier, CREN, Le Mans University; Pascal Leroux, CREN, Le Mans Université

1249950

5 A Deep Learning Framework for Blind Time-Frequency Localization in Wideband Systems

Surya K, UBC; Kevin Dsouza, Vijay Bhargava, University of British Columbia; Shankhanaad Mallick, Hamidreza Boostanimehr, Skyclope Technologies Inc.

2B: Localization Techniques II

1249560

1 A Benchmark of Dual Constellations GNSS Solutions for Vehicle Localization in Container Terminals

Carlos Rizzo, Daniel Serrano, EURECAT, Centre Tecnologic de Catalunya

1249026

2 A low complexity GNSS spoofing detection method for vehicular applications

Barend Lubbers, Netherlands Defence Academy

1249188

3 A Simplified Message-Passing Strategy for Localization in Vehicular Networks

Hong Ki Kim, Minji Kim, Sang Hyun Lee, Korea University

1249612

4 Multi-Stage Localization for Massive MIMO 5G Systems

Sellami Amal, Leila Nasraoui, Leila Najjar, Sup'Com

1249858

5 RSS-based Indoor Passive Localization Using Clustering and Filtering in an LTE Network

Huiwen Zheng, Xiaofeng Zhong, Tsinghua University; Peng Liu, Beijing Intersai Technology Co, Ltd.

2C: Machine Learning Based Techniques I

1246466

1 A Machine Learning Approach for Beamforming in UDN Considering Selfish and Altruistic Balance

Changyin Sun, Fan Jiang, Xiaoxiao Wang, Xi'an University of Posts and Telecommunications; Hongfeng Qin, Sang Sun, Xi'an Institute ZTE Corporation

1246654

2 Deep Learning Assisted Beam Prediction Using Out-of-Band Information

Ke Ma, Peiyao Zhao, Zhaocheng Wang, Tsinghua University

1245906

3 Deep Learning for Beam Hopping in Multibeam Satellite Systems

Lei Lei, Eva Lagunas, Yaxiong Yuan, Mirza Kibria, Symeon Chatzinotas, Bjorn Ottersten, University of Luxembourg

1250240

4 Understanding the Potential of Edge-Based Participatory Sensing: an Experimental Study

Breno Dantas Cruz, Junjie Cheng, Zheng Song, Eli Tilevich, Virginia Tech

1245754

5 Semi-Supervised Detection of Tariff Limits in LTE Network Benchmarks

Lukas Eller, Technische Universität Wien

2D: Machine Learning Based Techniques II

1247096

1 Improved Deep Learning in OFDM Systems With Imperfect Timing Synchronization

Ziming He, Samsung Cambridge Solution Centre Ltd; Xuan Huang, W. S. I. Industrial Co., Ltd

1247962

2 Clipping Noise Estimation Based on Deep Complex Neural Network with Sparsity Constraint

Xudong Zhang, Yu Zhang, Xiaohua Chang, Yichen Wu, Changyong Pan, Tsinghua University

1249626

3 PAPR Reduction Scheme for Deep Learning-Based Communication Systems Using Autoencoders

Melika Vahdat, Koosha Pourtahmasi Roshandeh, Masoud Ardakani, Hai Jiang, University of Alberta

1247362

4 Support Vector Machines for Self-Interference Cancellation in Mobile Communication Transceivers

Christina Auer, Kyriaki Kostoglou, Thomas Paireder, Mario Huemer, Johannes Kepler University Linz

1248046

5 Reinforcement Learning Based Antenna Selection in User-Centric Massive MIMO

xinxinChai, Hui Gao, Beijing University of Posts and Telecommunications; Ji Sun, Institute of Telecommunications; Xin Su, Tsinghua University; Tiejun Lv, Beijing University of Posts and Telecommunications; Jie Zeng, Tsinghua University

2E: Machine Learning Based Techniques III

1246326

1 High-precision SNR Estimation by CNN using PSD Image for Adaptive Modulation and Coding

Shun Kojima, Kazuki Maruta, Chang-Jun Ahn, Chiba University

1248356

2 Modulation Classification using Joint Time and Frequency-domain Data

Diogo Figueiredo, António Furtado, Rodolfo Oliveira, Universidade Nova de Lisboa/Instituto de Telecomunicações

1247988

3 Recurrent Neural Networks with Long Short-Term Memory for Fading Channel Prediction

Wei Jiang, German Research Center for Artificial Intelligence; Hans Schotten, University of Kaiserslautern

1244986

4 Instantaneous Signal Collision Detection Using In-Band Full-Duplex: Machine Learning VS Domain-specific Knowledge

Seyed Ali Hassani, KU Leuven; Xianjun Jiao, Ingrid Moerman, Ghent University - imec; Sofie Pollin, KU Leuven

1249764

5 Millimeter Wave Base Stations with Cameras: Vision-Aided Beam and Blockage Prediction

Muhammad Alrabeiah, Andrew Hredzak, Ahmed Alkhateeb, Arizona State University

2F: Machine Learning Based Techniques IV

1249214

1 A Machine Learning Based Multi-flips Successive Cancellation Decoding Scheme of Polar Codes

Bi He, Harbin Institute of Technology, Shenzhen; Shaohua Wu, Harbin Institute of Technology; Yajing Deng, Hao Yin, Harbin Institute of Technology, Shenzhen; Jian JIAO, Harbin Institute of Technology (Shenzhen); Zhang Qinyu, Harbin Institute of Tech.

1248518

2 Blind SIR Estimation by Convolutional Neural Network Using Visualized IQ Constellation

Kazuki Maruta, Shun Kojima, Chang-Jun Ahn, Chiba University; Daisuke Hisano, Osaka University; Yu Nakayama, Tokyo University of Agriculture and Technology

1250226

3 Path Loss Prediction in Smart Campus Environment: Machine Learning-based Approaches

Harsh Singh, Shivam Gupta, Charchit Dhawan, Amrita Mishra, DSPM International Institute of Information Technology

1249760

4 Robust and Fast Automatic Modulation Classification with CNN under Multipath Fading Channels

Kürşat Tekbiyik, Istanbul Technical University; Ali Riza Ekti, Balıkesir University; Ali Gorcin, Yildiz Technical University; Gunes Kurt, Istanbul Technical University; Cihat Keçeci, Texas A&M University

2G: Machine Learning Based Techniques V

1248008

1 Identification of Vehicle Obstruction Scenario Based on Machine Learning in Vehicle-to-vehicle Communications

Mi Yang, Bo Ai, Ruisi He, Chen Huang, Beijing Jiaotong University; Jianzhi Li, the State Key Lab of Wireless Mobile Communications; Zhangfeng Ma, Beijing Jiaotong University; Liang Chen, Xue Li, Huawei Technologies; Zhangdui Zhong, Beijing Jiaotong University

1249894

2 Intrusion detection on robot cameras using spatio-temporal autoencoders: A self-driving car application

Faouzi Amrouche, Sofiane Lagraa, Raphael Frank, Radu State, University of Luxembourg

1249652

3 Quality of experience prediction in mobility scenarios based on recurrent neural networks

Gonzalo J. Anaya-López, Universidad de Málaga; Carlos Cárdenas-Angelat, DEKRA Testing and Certification S.A.U; David Jiménez Soria, Universidad de Málaga; Mari Carmen Aguayo-Torres, Universidad de Málaga; Noelia Guerra-Melgares, Juana Baños-Polglase, DEKRA Testing and Certification S.A.U

1248884

4 Trajectory Prediction of Traffic Agents: Incorporating context to machine learning approaches

Vyshakh Palli Thazha, ENSTA Paris

2H: Deep Learning I

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1 A Deep Learning Method to Predict Fading Channel in Multi-Antenna Systems

Wei Jiang, German Research Center for Artificial Intelligence; Hans Schotten, University of Kaiserslautern

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2 Approximate Symbolic Explanation for Neural Network Enabled Water-Filling Power Allocation

Schylar Chengyao Sun, Weisi Guo, Cranfield University

1248934

3 Deep Learning for Over-the-Air Non-Orthogonal Signal Classification

TONGYANG XU, university college london; Izzat Darwazeh, University College London

1249466

4 Enhancing Least Square Channel Estimation Using Deep Learning

Abdul karim Gizzini, ETIS, UMR8051, CY Cergy Paris Université, ENSEA, CNRS, France; Marwa Chafii, ENSEA, ETIS; Ahmad Nimr, Technische Universität Dresden, Germany; Gerhard Fettweis, Technical University of Dresden

1249914

5 Radio Frequency Interference Detection using Deep Learning

Yosr Ghanney, Wessam Ajib, University of Quebec at Montreal

2I: Deep Learning II

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1 Autoencoder based Robust Transceivers for Fading Channels using Deep Neural Networks

Sandesh Rao Mattu, Indian Institute of Science; Lakshmi Narasimhan, IIT Palakkad; A Chockalingam, Indian Institute of Science

1248986

2 DL-Aided NOMP: a Deep Learning-Based Vital Sign Estimating Scheme Using FMCW Radar

Hsin-Yuan Chang, National Tsing Hua University, Taiwan, R.O.C.; Chia-Hung Lin, Yu-Chien Lin, National Chiao Tung University; Wei-Ho Chung, National Tsing Hua University, Taiwan, R.O.C.; Ta-Sung Lee, National Chiao Tung University

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3 Low Complexity Autoencoder based End-to-End Learning of Coded Communications Systems

Nuwanthika Rajapaksha, Nandana Rajatheva, Matti Latva-aho, University of Oulu

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4 Uncertainty Propagation in Neural Network Enabled Multi-Channel Optimisation

Chen Li, Schylar Chengyao Sun, Saba Al-Rubaye, Antonios Tsourdos, Weisi Guo, Cranfield University

2J: Resource Allocation and Management

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1 Deep Reinforcement Learning Based Power Allocation for D2D Network

Zhengran Bi, Wenan Zhou, Beijing University of Posts and Telecommunications

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2 Machine Learning for QoS-Aware Fairness of a D2D Network

Xian Liu, University of Arkansas at Little Rock; Changcheng Huang, Carleton University

1245258

3 Machine Learning assisted Handover and Resource Management for Cellular Connected Drones

Amin Azari, KTH Royal Institute of Technology; Fayeze Ghavimi, Aalto University; Mustafa Ozger, KTH Royal Institute of Technology; Riku Jäntti, Aalto University; Cicek Cavdar, KTH Royal Institute of Technology

1245492

4 Energy Consumption Optimization for CSMA/CAProtocol Employing Machine Learning

MSc Paulo Barbosa, Bruna Silva, Universidade Federal de Pernambuco (UFPE); Cleber Zanchettin, Federal University of Pernambuco; Renato Mariz de Moraes, Federal University of Pernambuco (UFPE)

1245214

5 QMORA: A Q-Learning based Multi-objectiveResource Allocation Scheme for NFV Orchestration

Jing Chen, Jia Chen, Renkun Hu, Hongke Zhang, Beijing Jiaotong University

2K: Vehicular Networks

1248110

1 Increasing Situational Awareness in Vehicular Networks: Passive Traffic Sensing Based on Machine Learning

Halit Bugra Tulay, The Ohio State University; Ron Burton, Transportation Research Center Inc, Columbus, OH; Frank Barickman, John Martin, Sugosh Rao, The National Highway Traffic Safety Administration; Can Emre Koksall, The Ohio State University

1247828

2 QoS Predictability in V2X Communication with Machine Learning

Darlan Cavalcante, GTEL - Federal University of Ceará; Igor Guerreiro, GTEL - Wireless Telecommunications Research Group; Wanlu Sun, Ericsson Research; Charles Casimiro Cavalcante, Universidade Federal do Ceará; Diego A. Sousa, Federal University of Ceará

1247532

3 Intelligent Task Offloading Algorithm for Mobile Edge Computing in Vehicular Networks

Yaping Cui, Yingjie Liang, Ruyan Wang, Chongqing University of Posts and Telecommunications

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4 A CNN-LSTM Model for Traffic Speed Prediction

Miaomiao Cao, Victor O.K. Li, University of Hong Kong; Vincent W.S. Chan, Massachusetts Institute of Technology

1247878

5 Machine Learning based Network Planning in Drone Aided Emergency Communications

Jian He, Shanghai Aerospace Electronic Technology Institute; Jiangzhou Wang, H. Zhu, Nathan J. Gomes, University of Kent; Wenchi Cheng, Peng Yue, Xiang Yi, Xidian University

2L: Wireless Networks IV

1248582

1 Virtual Development and Validation of a Function for an Automated Lateral Control using Artificial Neural Networks and Genetic Algorithms

Xiaobo Liu-Henke, Or Aviv Yarom, Soeren Scherler, Ostfalia University of Applied Sciences

1248104

2 Dynamic Spectrum Access with Reinforcement Learning for Unlicensed Access in 5G and Beyond

Susanna Mosleh, Yao Ma, Jacob D. Rezac, Jason B. Coder, NIST

1248120

3 An Access Control Mechanism Based on Risk Prediction for the IoV

Yuanni Liu, Man XIAO, Yanyan Zhou, Chongqing University of Posts and Telecommunications; Di Zhang, Zhengzhou University; Jianhui Zhang, NationalDigitalSwitchingSystemEngineering & Technological R&D Center; Haris Gacanin, Nokia Bell Labs, Antwerp, Belgium; Jianli Pan, University of Missouri-Sanit Louis

1246206

4 Slice Management in Radio Access Network via Deep Reinforcement Learning

Behnam Khodapanah, Technische Universität Dresden; Ahmad Awada, Nokia Bell Labs; Ingo Viering, Nomor Research GmbH; Andre Noll Barreto, Barkhausen Institut; Meryem Simsek, Gerhard P. Fettweis, Technische Universität Dresden

1249666

5 ViWi: A Deep Learning Dataset Framework for Vision-Aided Wireless Communications

Muhammad Alrabeiah, Andrew Hredzak, Zhenhao Liu, Ahmed Alkhateeb, Arizona State University

Track 3: Antenna Systems, Propagation, and RF Design

3A: 5G Propagation & Measurement

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1 A Fast Stochastic Ray-Tracing Method for the 5G Vehicle-to-Vehicle Communication

Piotr Gorniak, Poznan University of Technology

1246890

2 A mmWave Bridge Concept to Solve the Cellular Outdoor-to-Indoor Challenge

Adrian Schumacher, Ruben Merz, Swisscom (Switzerland) Ltd.; Andreas Burg, EPFL

1245122

3 Experimental Characterization of Non-Stationary V2I Radio Channel in Tunnels

Marwan Yusuf, Ghent University

1248244

4 Measurement Based Statistical Channel Characterization of Air-to-Ground Path Loss Model at 446MHz for Narrow-Band Signals in Low Altitude UAVs

Burak Ede, Istanbul Technical University; Serhan Yarkan, Istanbul Ticaret University; Ali Riza Ekti, Balıkesir University; Tuncer Baykas, Medipol University; Hakan Ali Çırpan, Istanbul Technical University; Ali Gorcin, Yildiz Technical University

1246578

5 Narrowband Characteristics of Air-to-Ground Propagation for UAV Assisted Networks in Urban Environments By Means of Fast Ray-Launching Simulations

Maximilian James Arpaio, Enrico Maria Vitucci, Marina Barbiroli, Vittorio Degli-Esposti, Diego Masotti, Franco Fuschini, University of Bologna

3B: Channel Modeling & Measurements

1244664

1 3D Beamforming based Dynamic TDD Interference Mitigation Scheme

Jalal Rachad, Ridha Nasri, Orange Labs; Laurent Decreusefond, Telecom Paristech

1247684

2 An Efficient Calibration of a Fully-Switched MIMO Channel Sounder with Internal Crosstalk

Junseok Kim, Eun Ae Lee, Pohang University of Science and Technology (POSTECH); Chung-Sup Kim, Young-Jun Chong, Electronic Telecommunications Research Institute (ETRI); Joon Ho Cho, Pohang University of Science and Technology (POSTECH)

1246872

3 Antenna Selections for Multi-Target Detection of Vehicular mmWave Radar with Large Antenna Arrays

Kai-Rey Liu, Sau-Hsuan Wu, National Chiao Tung University; Prof. Lie-Liang Yang, University of Southampton

1245056

4 Bandwidth Expansion of the IBFD Communication System Using Balanced Feed Networks

Myunggi Kim, Heung-Gyoon Ryu, Chungbuk National University

1248260

5 Performance Analysis of Wireless Communication Systems Subject to k-u Extreme Fading

Jules M. Moualeu, University of the Witwatersrand; Daniel Benevides da Costa, Federal University of Ceara (UFC); Rausley Adriano Amaral de Souza, National Institute of Telecommunications (Inatel); Walaa Hamouda, Concordia University; Ugo Dias, University of Brasilia

3C: Channel Modeling & EMF

1249272

1 Exposure Modelling and Minimization for Multi-antenna Communication Systems

Fabien Heliot, Muhammad Ali Jamshed, Tim W. C. Brown, University of Surrey

1248870

2 Is It Safe Living in the Vicinity of Cellular Towers? Analysis of Long-Term Human EMF Exposure at Population Scale

Luca Chiaraviglio, Cristian di Paolo, Giuseppe Bianchi, University of Rome Tor Vergata; Nicola Blefari Melazzi, University of Rome Tor Vergata & CNIT

1249818

3 Measurement Campaign with Synchronized Distributed Receivers and Mobile Emitter at 3.75 GHz in Urban Scenarios

Julia Bauer, Fraunhofer Institute for Integrated Circuits IIS; Carsten Andrich, Institute for Information Technology, Technische Universität Ilmenau; Michael Döbereiner, Fraunhofer Institute for Integrated Circuits IIS; Steffen Schieler, James Myint, Alexander Ihlow, Christian Schneider, Reiner Thomä, Technische Universität Ilmenau; Giovanni Del Galdo, Fraunhofer Institute for Integrated Circuits IIS

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4 The Multipath Characteristic of an Intra-Vehicle Channel under the Non-Line-of-Sight Condition

Irfan Yusoff, Xiaohong Peng, Aston University

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5 Will the Proliferation of 5G Base Stations Increase the Radio-Frequency “Pollution”?

Luca Chiaraviglio, Giuseppe Bianchi, University of Rome Tor Vergata; Nicola Blefari Melazzi, University of Rome Tor Vergata & CNIT; Marco Fiore, IEIIT - CNR

Track 4: Cognitive Radio and Dynamic Spectrum Access

4A: Cellular & Cognitive Radio Networks

1247346

1 Antenna Selection and Resource Allocation in Downlink MISO OFDMA Femtocell Networks

Jalal Jalali, Ghent University; Ata Khalili, Amirkabir University of Technology; Heidi Steendam, Ghent University

1250122

2 Relaying techniques based outage analysis for mobile users in cognitive radio networks

Samuel, Okegbile; Sunil Maharaj, University of Pretoria; Attahiru Alfa, University of Manitoba & University of Pretoria

1248374

3 Symbol Error Rate with Receiver Nonlinearity

Jennifer Dsouza, Virginia Tech University; Hossein Mohammadi, Mississippi State University; Aditya Padaki, Virginia Tech; Vuk Marojevic, Mississippi State University; Jeffrey Reed, Virginia Tech

1249274

4 Deep Learning Meets Cognitive Radio: Predicting Future Steps

Alex Shenfield, Sheffield Hallam University; Zaheer Khan, University of Oulu; Hamed Ahmadi, University College Dublin

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5 Secondary User Experience-oriented Resource Allocation in AI-empowered Cognitive Radio Networks Using Deep Neuroevolution

Mduduzi Comfort Hlophe, Sunil Maharaj, University of Pretoria

4B: Spectrum Sensing & Sharing

1247670

1 A Ruin Theory-Inspired Co-primary Spectrum Sharing Mechanism for 5G

Zaw Htike, Fumihide Kojima, National Institute of Information and Communications Technology

1249646

2 Capacity Evaluation of LTE Network in Dynamic Spectrum Access and Interference Analysis

Raphael B. Evangelista, Wireless Telecommunications Research Group; Carlos Filipe Moreira e Silva, Yuri Silva, Federal University of Ceará

1248476

3 Dynamic Spectrum Management for European-Wide Research Network

Ilkka Harjula, VTT Technical Research Centre of Finland; Laura Panizo, Barbara Valera-Muros, University of Málaga; Jarno Pinola, Mika Hoppari, VTT Technical Research Centre of Finland; Adam Flizikowski, Maria Safianowska, IS-Wireless

1249482

4 Radio Environment Maps for Dynamic Frequency Selection in V2X Communications

Pawel Sroka, Pawel Kryszkiewicz, Adrian Kliks, Poznan University of Technology

1247676

5 Spectrum Prediction for Frequency Bands with High Burstiness: Analysis and Method

PeiLiang Zuo, Tao Peng, Xinyue Wang, Kangyong You, Beijing University of Posts and Telecommunications; Hanbo Jing, Beijing Institute of Remote Sensing Equipment; Wenbin Guo, Wenbo Wang, Beijing University of Posts and Telecommunications

Track 5: Multiple Antenna Systems and Cooperative Communications

5A: Beamforming and Hybrid Beamforming

1246806

1 Baseband Codebook Design with Long-term Information for Hybrid Beamforming Systems

Gaozheng Liu, Li Chen, Weidong Wang, Xiaohui Chen, University of Science and Technology of China

1248050

2 Hybrid Precoding for Millimeter Wave Multiuser Massive MIMO Systems with Low-Resolution DACs

Yajing Guo, Yunliang Zhang, Shuaifei Chen, Jiakang Zheng, Jiayi Zhang, Beijing Jiaotong University

1247446

3 Low Complexity Channel Estimation for Hybrid Beamforming Systems

Yanru Tang, Samsung; Hongbing Cheng, Samsung Electronics; Kee-Bong Song, Samsung Semiconductors Inc.

1249590

4 Simultaneous Beamforming and Nullforming for Covert Wireless Communications

Justin Kong, Fikadu Dagefu, Brian M. Sadler, U. S. Army Research Laboratory

1247714

5 Subchannel Gain Product based Frequency Selective Hybrid Beamforming with Limited Feedback

Hyunwoo Nam, Girim Kwon, Namshik Kim, Hyuncheol Park, Korea Advanced Institute of Science and Technology (KAIST)

5B: Estimation, Allocation, and Performance Analysis

1248942

1 Bayesian CRLB for Joint AoA, AoD, and Channel Estimation Using UPA in Millimeter-wave Communications

Imtiaz Ahmed, Marshall University; Ramesh Annavajjala, Draper Labs; Laxminarayana S Pillutla, Intel Corporation

1248996

2 Low Complexity Quasi-MLM Modulation Classification based Optimal Overloaded MU-MIMO Receiver

Sairaj Desai, K Giridhar, IIT Madras

1246306

3 Optimum Resource Allocation in MU-MIMO OFDMA Wireless Systems

Chandra S. Bontu, Amr El-Keyi, Ericsson Canada; Jagadish Ghimire, Ericsson

1247580

4 Performance Analysis of Matched-Filter Precoded MISO-OFDM Systems in the Presence of Imperfect CSI

Trung-Hien Nguyen, Université libre de Bruxelles; Jerome Louveaux, Université Catholique de Louvain; Philippe De Doncker, Francois Horlin, Université Libre de Bruxelles

1247596

5 Supervised learning based super-resolution DoA estimation utilizing antenna array extrapolation

Udaya Sampath K.P. Miriya Thantrige, Ruhr-University Bochum; Aya Mostafa Ahmed, Ruhr University Bochum, Germany.; Aydin Sezgin, Ruhr-University Bochum

5C: Heterogeneous and Cooperative Communication

1246006

1 Performance Analysis of HAPS-Based Relaying for Hybrid FSO/RF Downlink Satellite Communication

Swaminathan R, Indian Institute of Technology Indore, India; Shubha Sharma, A.S. Madhukumar, Nanyang Technological University

1249454

2 Performance Comparison of Adaptive Terminal Selection Schemes for Terminal Collaborated MIMO Reception Using Actual Received Signals

Mampe Kasai, Hidekazu Murata, Kyoto University

1247408

3 Performance Evaluation of Adaptive Cooperative NOMA Protocol at Road Junctions

Baha Eddine Youcef Belmekki, IIRIT/ENSEEIH; Abdelkrim Hamza, USTHB; Benoit Escrig, Université de Toulouse

1247692

4 Performance of Dual-Hop Hybrid FSO/RF System with Pointing Errors Optimization

Shubha Sharma, A.S. Madhukumar, Nanyang Technological University; Swaminathan R, Indian Institute of Technology Indore, India

5D: Relaying

1249282

1 Addressing Reliability Needs of Industrial Applications in 5G NR with Network Coding

Stefano Paris, Petteri Kela, Daniela Laselva, Qiyang Zhao, Nokia Bell Labs

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2 Cooperative AF-based 3D Mobile UAV Relaying for Hybrid Satellite-Terrestrial Networks

Pankaj Kumar Sharma, National Institute of Technology Rourkela; Deepika Gupta, S P M IIT, Naya Raipur, India; Dong In Kim, Sungkyunkwan University

1249054

3 Full-Duplex Spoofing Relays for Wireless Surveillance With Inter-Relay Interference Suppression

Jihwan Moon, Korea University; Hoon Lee, Pukyong National University; Changick Song, Korea National University of Transportation; Seowoo Kang, Minseok Kim, Inkyu Lee, Korea University

1249524

4 Secure Transmission Scheme Design for SWIPT in Buffer-aided Relay Networks

Juanjuan Ren, Xianfu Lei, Southwest Jiaotong University; Panagiotis D. Diamantoulakis, Aristotle University of Thessaloniki; Qingchun Chen, Guangzhou University; George Karagiannidis, Aristotle University of Thessaloniki

1249642

5 X-Duplex Decode-and-Forward Relaying with Direct Link: A DPC-Based Transmission Scheme

Peixi Liu, Wei Jiang, Wu Luo, Peking University; Tiansheng Zhang, Keysight Technologies Inc.

5E: Massive MIMO

1246002

1 An Efficient Signal Extraction Scheme in Uplink Massive MIMO Systems

Guo Li, Xiao Zhang, Xidian University

1248078

2 Digital Beamforming with PAPR Reduction: An Approach for Energy Efficient Massive MIMO

Christian Schmidt, Universidad Nacional del Sur; Matthieu Crussière, Institute of Electronics and Telecommunications of Rennes; Jean-François Helard, INSA Rennes

1250346

3 Massive MIMO Indoor Localization with 64-Antenna Uniform Linear Array

Bin Liu, Andrea Guevara, Sibren De Bast, Qing Wang, Sofie Pollin, KU Leuven

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4 Parameter Optimization for Energy Efficient Indoor Massive MIMO Small Cell Networks

Chen Chen, Yan Jiang, Jiliang Zhang, Xiaoli Chu, Jie Zhang, University of Sheffield

1247524

5 Power Allocation and Cooperation in Cell-Free Massive MIMO Systems with Energy Exchange Capabilities

Rami Hamdi, Marwa Qaraqe, Hamad Bin Khalifa University

5F: mmWave Systems II

1249126

1 A Blind Beam Tracking Scheme for Millimeter Wave Systems

Steve Blandino, KU Leuven; Thibault Bertrand, UC Louvain; Claude Desset, Andre Bourdoux, imec; Sofie Pollin, KU Leuven; Jerome Louveaux, Université Catholique de Louvain

1247726

2 Ergodic Energy Efficiency of mmWave System Considering Insertion Loss Under Dynamic Subarray Architecture

Ji-Chong Guo, Qiyue Yu, Weixiao Meng, Harbin Institute of Technology; Wei Xiang, James Cook University

1247184

3 Fixed mmWave Multi-User MIMO: Performance Analysis and Proof-of-Concept Architecture

Achiel Colpaert, Evgenii Vinogradov, Sofie Pollin, KU Leuven

1249112

4 STS Adaptation for Beamforming Training of Asymmetric Links in IEEE 802.11ay-based Dense Networks

Yena Kim, NIST; SuKyoung Lee, Yonsei University; Tanguy Ropitault, NIST

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5 Systematic Beam Management in mmWave Network: Tradeoff Among User Mobility, Link Outage, and Interference Control

Honghao Ju, Yan Long, Xuming Fang, Rong He, Southwest Jiaotong University

5G: Vehicular Communications IV

1250036

1 A Novel Decentralized and Flexible Policy for Flow Mobility Management

Edivaldo P. Valentini, Federal Institute of São Paulo; Daniel L. Guidoni, Federal University of São João del-Rei; Leandro Villas, Institute of Computing - University of Campinas; Robson De Grande, Brock University; Rodolfo I. Meneguette, Federal Institute of São Paulo

1247808

2 Adaptive Power Control with Vehicular Trellis Architecture for Vehicular Communication Systems

Akinsola Akinsanya, Manish Nair, H. Zhu, Jiangzhou Wang, University of Kent

1247816

3 Joint Vehicle-Beam Allocation for Reliability and Coverage in Vehicular Communication Systems

Akinsola Akinsanya, University of Kent; Manish Nair, The University of Kent; H. Zhu, Jiangzhou Wang, University of Kent

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4 Power-and-Index based Multiple Access for V2X Networks

Sunyoung Lee, Mahrddad Dianati, University of Warwick; Youngwook Ko, University of York; Alexandros Mouzakitis, Jaguar Land Rover

1247032

5 Self-Interference Cancellation and Beamforming in Repeater-assisted Full-duplex Vehicular Communication

Ahmed S. Ibrahim, Florida International University

Track 6: Radio Access Technology and Heterogeneous Networks

6A: Heterogeneous Networks I

1249148

1 A Unified Analytical Approach to Multi-Cell LBT-Based Spectrum Sharing Systems

Yao Ma, Susanna Mosleh, Jason B. Coder, National Institute of Standards and Technology

1249604

2 Cache-Aided Device-to-Device Non-Orthogonal Multiple Access

Kevin Zhaoan Shen, Turki E A Alharbi, Daniel K C So, University of Manchester

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3 Cloud-based Queuing Model for Tactile Internet in Next Generation of RAN

Narges Gholipour, University of Tarbiat Modares; Saeedeh Parsaeefard, Iran Telecommunication Research Center; Mohammad R. Javan, Shahrood University; Nader Mokari, Hamid Saeedi, Tarbiat Modares University; Hossein Pishro-Nik, University of Massachusetts, Amherst

1247842

4 Coordinated Scheduling and Power Control for Non-Orthogonal Multiple Access (NOMA) enabled H-CRAN

Rupesh Singh Rai, H. Zhu, Jiangzhou Wang, University of Kent

1248036

5 Design of PDMA Pattern Matrix in 5G Scenarios

Jiaying Sun, Tsinghua University; Chang, Wang; Jie Zeng, Xin Su, Tsinghua University; Tiejun Lv, Beijing University of Posts and Telecommunications

6B: Heterogeneous Networks II

1247712

1 Flexible Soft Frequency Reuse for Interference Management in the Networks with Flying Base Stations

Md Sakir Hossain, Zdenek Becvar, Czech Technical University in Prague

1248094

2 Full Coverage with 3GPP technologies - On the feasibility of providing full rural cellular coverage

Niklas Jalden, Jialu Lun, Pal Frenger, Anders Furuskar, Sathya Venkatasubramanian, Elmar Trojer, Ericsson AB

1246182

3 Hierarchical Scheduling with FPGA-based Accelerator for Flexible 5G Mobile Networks

Yuki Arikawa, Takeshi Sakamoto, Satoshi Shigematsu, NTT Corporation

1247494

4 How to Associate Users with Access Points in a Small Cell Network?

Hong Yang, Bell Labs, Nokia

1249536

5 Improved Frequency Domain Resource Allocation Indication

Kittipong Kittichokechai, Mattias Andersson, Robert Baldemair, Ericsson Research; Yufei Blankenship, Ericsson AB

6C: Heterogeneous Networks III

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1 Integration of Dimming into LiFi Systems

Trang Nguyen, Mohamed Islim, Harald Haas, University of Edinburgh

1247540

2 Interference Control of LTE-LAA using Q-learning with HARQ

Kenshiro Wada, Tomoaki Ohtsuki, Keio University

1248026

3 Lightweight Comprehensive Evaluation Method for Wireless User Perception Based on Random Forest

Kaixuan Zhang, Guanghui Fan, Jun Zeng, Guan Gui, Nanjing University of Posts and Telecommunications

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4 Measurement based FHSS-type Drone Controller Detection at 2.4GHz: An STFT Approach

Batuhan Kaplan, Istanbul Technical University; İbrahim Kahraman, Boğaziçi University; Ali Gorcin, Yıldız Technical University; Hakan Ali Çırpan, İstanbul Technical University; Ali Riza Ekti, Balıkesir University

1244894

5 Memory-affecting Network Selection in Next Generation HetNets

Shaoan Feng, Dusit Niyato, Nanyang Technological University; Xiao Lu, University of Alberta; Ping Wang, Nanyang Technological University; Dong In Kim, Sungkyunkwan University

6D: Heterogeneous Networks IV

1247354

1 Next Generation Wi-Fi Mesh for Indoor Residential Deployments

Lester Ho, Adrian Garcia-Rodriguez, Lorenzo Galati Giordano, David Lopez Perez, Nokia Bell Labs

1247262

2 Next Generation Wi-Fi: Deployment Guidelines and Benefits of Massive MIMO for the Enterprise

Lorenzo Galati Giordano, Adrian Garcia-Rodriguez, Lester Ho, David Lopez Perez, Nokia Bell Labs

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3 On the Design of B5G Multi-Beam LEO Satellite Internet of Things

Jianhang Chu, Xiaoming Chen, Qiao Qi, Caijun Zhong, Zhejiang University; Hai Lin, Osaka Prefectural University; Zhaoyang Zhang, Zhejiang University

1247904

4 Physical Cell ID Detection Probability Using Synchronization Signals of NB-IoT Radio Interface in 28-GHz Band

Daisuke Inoue, Kyogo Ota, Mamoru Sawahashi, Tokyo City University; Satoshi Nagata, NTT DOCOMO, INC.

1248130

5 Prediction of V2V channel quality under double-Rayleigh fading channels

yifan Chen, Zheng Dou, Lin Qi, Ying Li, Harbin Engineering University

6E: Intelligent Communications I

1248232

1 Cell-Free Massive MIMO with Few-bit ADCs/DACs: AQNM versus Bussgang

Yao Zhang, Haotong Cao, Meng Zhou, Xu Qiao, Shengchen Wu, Longxiang Yang, Nanjing University of Posts and Telecommunications

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2 Cellular Network Performance using Machine Learning based Quantitative Association Rule Mining Method

Guanghui Fan, Juan Wang, Kaixuan Zhang, Jun Zeng, Guan Gui, Nanjing University of Posts and Telecommunications

1248016

3 Convolutional Neural Network Aided Signal Modulation Recognition in OFDM Systems

Sheng Hong, Hao Gu, Yu Wang, Nanjing University of Posts and Telecommunications; Yuwen Pan, Sainty-tech Communications Limited; Miao Liu, Jie Yang, Guan Gui, Nanjing University of Posts and Telecommunications

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4 En-route Multilateration System Based on ADS-B and TDOA/AOA for Flight Surveillance Systems

Dongxu Zhao, Jinlong Sun, Guan Gui, Nanjing University of Posts and Telecommunications

1247744

5 Large Intelligent Reflecting Surface Enhanced Massive Access for B5G Cellular Internet of Things

Guanghua Yu, Xiaoming Chen, Caijun Zhong, Zhejiang University; Hai Lin, Osaka Prefectural University; Zhaoyang Zhang, Zhejiang University

6F: Intelligent Communications II

1247924

1 Modulation Classification Method based on Deep Learning under Non-Gaussian Noise

Minghuan Ma, Zhigang Li, Yun Lin, Harbin Engineering University; Lei Chen, College of Engineering and Computing; Sen Wang, Harbin Engineering University

1246448

2 Real-Time Routing for Wireless Relay Fronthaul with Vehicle-Mounted Radio Units

Yu Nakayama, Tokyo University of Agriculture and Technology; Yuko Hara-Azumi, Anh Hoang Ngoc Nguyen, Tokyo Institute of Technology; Daisuke Hisano, Osaka University; Takayuki Nishio, Kyoto University; Kazuki Maruta, Chiba University

1247790

3 Research on RF Fingerprint Feature Selection Method

Ying Li, Yun Lin, Zheng Dou, Yifan Chen, Harbin Engineering University

1248202

4 User Association to Overcome Human Blockage at mmWave Cellular Networks

Yuva Kumar, Tomoaki Ohtsuki, Keio University

6G: Networks

1249140

1 An Energy-Efficient IEEE 802.11ad Mesh Network for Seismic Acquisition

Varun Amar Reddy, Georgia Institute of Technology; Gordon Stüber, Georgia Tech; Suhail I. Al-Dharrab, Ali Hussein Muqaibel, Wessam Mesbah, King Fahd University of Petroleum and Minerals

1249372

2 Cooperative Edge Caching in Small Cell Networks with Heterogeneous Channel Qualities

Tao Nie, Jingjing Luo, Harbin Institute of Technology (Shenzhen); Lin Gao, Harbin Institute of Technology; Fu-Chun Zheng, Harbin Institute of Technology (Shengzhen) & The University of York; Li Yu, Huazhong University of Science and Technology

1249592

3 Dynamic Multi-RAT Access for Ultra Dense 5G and Beyond: A Mean Field Perspective

Nadif Sami, Hassan I University of Settat; Essaid Sabir, Hassan II University of Casablanca; Halima Elbiaze, University of Quebec a Montreal; Abdelkrim HAQIQ, Hassan 1st University, Faculty of Sciences and Techniques, Settat

1248950

4 LOCI: A Mobile Q&A System with Multimodal Motivation Scheme for Local Intent Questions in Dynamic Social Networks

Imad Ali, Academia Sinica and National Tsing Hua University; Ronald Y. Chang, Academia Sinica; Cheng-Hsin Hsu, National Tsing Hua University; Chi-Han Lee, National Taiwan University of Science and Technology

1249746

5 Socio-Cellular Network: A Novel Social Assisted Cellular Communication Paradigm

Swati Agarwal, BITS Pilani Goa Campus; Rahul Thakur, Utkarsh Yadav, IIT Roorkee; Hemant Rathore, BITS Pilani Goa Campus

6H: Radio Access I

1248734

1 5G and LTE-TDD Synchronized Coexistence with Blind Retransmission and Mini-Slot Uplink

Abdelrahim Mohamed, Atta Qudus, Pei Xiao, Bernard Hunt, Rahim Tafazolli, University of Surrey

1248228

2 Achievable Rate of Multi-Cell Downlink Massive MIMO Systems with D2D Underly

Ashraf Al-Rimawi, Birzeit University; Laith Ibrahim, Al-Quds Open University; Wessam Ajib, University of Quebec at Montreal

1247724

3 Antenna-Resource-Based SCMA in Downlink Multiuser Transmission Systems

Yipeng Zhang, Qiyue Yu, Zijing Liu, Yongkang Zhou, Weixiao Meng, Harbin Institute of Technology

1246058

4 Asynchronous Scrambled Coded Multiple Access for 5G Non-Orthogonal Multiple Access: System Level Performance

Rohit Iyer Seshadri, Hughes; Neal Becker, Mustafa Eroz, Hughes Network Systems, LLC; Lin-nan Less, Hughes Network Systems; Chin-Kuo Jao, Ting-Yu Yeh, Industrial Technology Research Institute; Chun-Yen Wang, ITRI

1246638

5 Coordinated Passive Beamforming for Distributed Intelligent Reflecting Surfaces Network

Jinglian He, Kaiqiang Yu, Yuanming Shi, ShanghaiTech University

1248368

6 Correlated Placement of Small Cell Base Stations: A Coverage Enriched HetNet with Massive MIMO

Bitan Banerjee, Robert Elliott, Witold Krzymień, University of Alberta; Jordan Melzer, TELUS Communications

6I: Radio Access II

1249610

1 Full-Duplex Cooperative Non-Orthogonal Multiple Access System With Feasible Successive Interference Cancellation

Turki E A Alharbi, Kevin Zhaoan Shen, Daniel K C So, University of Manchester

1243860

2 Reconfigurable Intelligent Surface Assisted Non-Orthogonal Unicast and Broadcast Transmission

Qiaochu An, Yuanming SHI, Yong Zhou, ShanghaiTech University

1247722

3 Uplink SCMA with STBC in Fading Channels

Huaning Li, Zijing Liu, Qiyue Yu, Harbin Institute of Technology; Wei Xiang, James Cook University; Fumiyuki Adachi, Tohoku University

6J: WiFi

1250158

1 Experimental evaluation of the two-ray model for near-shore WiFi-based network systems design

Miguel Gutiérrez Gaitán, Pedro M. Santos, CISTER Research Centre; Luis R. Pinto, IPFN, Instituto Superior Técnico, Lisboa; Luis Almeida, FEUP - Universidade do Porto, Portugal

1249312

2 IEEE 802.11ax (Wi-Fi 6): DL and UL MU-MIMO Channel Sounding Compression Schemes Impaired with IQ Imbalance and CFO

Roger Hoefel, Federal University of Rio Grande do Sul

1249076

3 openwifi: a free and open-source IEEE802.11 SDR implementation on SoC

Xianjun Jiao, Wei Liu, Michael Mehari, Muhammad Aslam, Ingrid Moerman, Ghent University - imec

1249580

4 Reinforcement Learning Approach for Hybrid WiFi-VLC Networks

Abdulmajeed Alenezi, Khairi Hamdi, University of Manchester

1249270

5 WiHAR: From Wi-Fi Channel State Information to Unobtrusive Human Activity Recognition

Muhammad Muaaz, Ali Chelli, Matthias Pätzold, University of Agder

6K: Resource Allocation I

1246176

1 Optimal Resource Allocation and Placement for Terrestrial and Aerial Base Stations in Mixed RF/FSO Backhaul Networks

Ju-Hyung Lee, Korea University; Ki-Hong Park, Mohamed-Slim Alouini, King Abdulah University of Science and Technology; Young-Chai Ko, Korea University

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2 Resource Allocation for Non-Orthogonal Multiple Access with Coordinated Multipoint Support

Jung-Chun Kao, National Tsing Hua University

1247274

3 Resource-Efficient Dual Connectivity for Ultra-Reliable Low-Latency Communication

Marco Centenaro, Aalborg University; Daniela Laselva, Jens Steiner, Nokia Bell Labs; Klaus Pedersen, Nokia; Preben Mogensen, Aalborg University

1247502

4 Security Provision for Vehicular Fog Computing

Jiaqi Huang, Yi Qian, University of Nebraska-Lincoln; Rose Qingyang Hu, Utah State University

1247758

5 Sequential Bargaining Game for Reuse of Radio Resources in D2D Communication in Dedicated Mode

Mehyar Najla, Zdenek Becvar, Pavel Mach, Czech Technical University in Prague

6L: Resource Allocation II

1249218

1 An Interference-Aware Optimal Data Collection Scheduling for Wi-SUN Advanced Metering Infrastructure Network

Amnart Boonkajay, Peng Hui Tan, Lee Kee Goh, Syed Naveen Altaf Ahmed, Sumei Sun, Institute for Infocomm Research

1249632

2 Integrated Agent-Based Model for Broadband Resource Allocation Analysis

Jennifer Legaspi, Kuldeep S. Gill, Worcester Polytechnic Institute; Casey Inez Canfield, Missouri University of Science & Technology; Alexander Wyglinski, Shamsnaz Virani Bhada, Worcester Polytechnic Institute

1248830

3 Joint Downlink Cell Association and Bandwidth Allocation with User Priorities in Two-Tier HetNets

Hongju Lee, Junhee Park, Sang-Hyun Lee, Inkyu Lee, Korea University

1250234

4 Resource Allocation Strategy for Mobile Edge Computing System with Hybrid Energy Harvesting

Jiafa Chen, Yisheng Zhao, Zhimeng Xu, Haifeng Zheng, Fuzhou University

1249614

5 Subcarrier and Power Allocation for Sparse Code Multiple Access

Yanely, Kevin Zhaoan Shen, Daniel K C So, University of Manchester

Track 7: Green Communications and Networks

7A: Green Communications I

1248916

1 An Autonomous Error-Tolerant Architecture Featuring Self-reparation for Convolutional Neural Networks

Lizheng Liu, Yuxiang Huan, Zhuo Zou, Fudan University; Xiaoming Hu, Royal Institute of Technology (KTH); Lirong Zheng, Fudan University

1243812

2 Constructions of Flexible-Size Deterministic Measurement Matrices Using Protograph LDPC Codes and Hadamard Codes

Kangjian Chen, Yi Fang, Guangdong University of Technology; Pingping Chen, Fuzhou University; Guofa Cai, Xiamen University; Jun Zhang, Guojun Han, Guangdong University of Technology

1247204

3 Energy-efficient Distributed Estimation Using Wireless Sensor with Wake-up Receivers

Hitoshi Kawakita, Hiroyuki Yomo, Kansai University; Petar Popovski, Aalborg University

1248222

4 Learning-Based Energy-Efficient Channel Selection for Edge Computing-Empowered Cognitive Machine-to-Machine Communications

Haijun Liao, Zhenyu Zhou, North China Electric Power University; Bo Ai, Beijing Jiaotong University; Mohsen Guizani, Qatar University

1249404

5 Noncooperative Resource Optimization for NOMA Based Fog Radio Access Network

Qiu Yu, Haijun Zhang, Keping Long, University of Science and Technology Beijing; Victor C. M. Leung, The University of British Columbia

7B: Green Communications II

1245572

1 Cell Association for Energy Efficient Resource Allocation in Decoupled 5G Heterogeneous Networks

Humayun Zubair Khan, Mudassar Ali, Imran Rashid, Abdul Ghafoor, National University of Sciences and Technology, Pakistan; Muhammad Naeem, Ryerson University

1249792

2 Energy Efficiency Maximization in Green Energy Aided Heterogeneous Cloud Radio Access Networks

Naveed Ahmad Chughtai, Mudassar Ali, Saad Qaisar, Muhammad Imran, National University of Sciences and Technology, Pakistan; Muhammad Naeem, Ryerson University

1247960

3 Priority-based Access Strategy for Multi-transmitter Multi-receiver Ambient Backscatter Communication System

Qian Chen, Xing Zhang, Jing Li, Jizhe Zhou, Beijing University of Posts and Telecommunications

1248312

4 Resource Allocation Strategy for MEC System Based on VM Migration and RF Energy Harvesting

Peng Fang, Yisheng Zhao, Zhichao Liu, Jincheng Gao, Zhonghui Chen, Fuzhou University

1248302

5 UAV-Assisted Time Division Power Allocation Strategy Based on RF Energy Harvesting

Zhichao Liu, Yisheng Zhao, Peng Fang, Jincheng Gao, Zhonghui Chen, Fuzhou University

7C: Green Communications III

1248020

1 Beam and User Selection Technique in Millimeter Wave Communications

Irem Cumali, Berna Ozbek, Izmir Institute of Technology; Alexander Pyattaev, YL-VERKOT OY

1248018

2 Compressive Sensing based Low Complexity User Selection for Massive MIMO Systems

Saadet Simay Yilmaz, Berna Ozbek, Izmir Institute of Technology

1247730

3 Joint Optimization of Age of Information and Energy Efficiency in IoT Networks

Qamar Abbas, Shah Zeb, Syed Ali Hassan, Rafia Mumtaz, National University of Sciences and Technology; Syed Ali Raza Zaidi, University of Leeds

1247688

4 On the Performance of Spatial Modulation Schemes in Large-Scale MIMO under Correlated Nakagami Fading

Ayesha Bint Saleem, National University of Sciences and Technology, Pakistan; Syed Ali Hassan, National University of Sciences and Technology

1245262

5 Sum of Average Throughput Maximization in Energy Harvesting Cooperative Wireless Communication

Mateen Ashraf, Luc Vandendorpe, Université catholique de Louvain

7D: Green Communications IV

1248862

1 Low Latency Ambient Backscatter Communications with Deep Q-Learning for Beyond 5G Applications

Furqan Jameel, University of Jyväskylä; Muhammad Ali Jamshed, University of Surrey; Zheng Chang, University of Jyväskylä; Riku Jäntti, Aalto University; Haris Pervaiz, Lancaster University

1247554

2 Packet Scheduling and Computation Offloading for Energy Harvesting Devices without CSIT

Ibrahim Fawaz, CEa; Mireille Sarkiss, Telecom SudParis; Philippe Ciblat, Telecom ParisTech

1248902

3 Performance Evaluation of Nonlinear Effects in Frequency-Splitting SWIPT Signals

Akashkumar Rajaram, Rui Dinis, Universidade Nova de Lisboa; João Madeira, Universidade Nova de Lisboa - Faculdade de Ciências e Tecnologias; Dushantha Nalin K. Jayakody, National Research Tomsk Polytechnic University; Marko Beko, Universidade Lusofona

1246946

4 SLPoW: Secure and Low Latency Proof of Work Protocol for Blockchain in Green IoT Networks

Abbas Yazdinejad, University of Guelph; Gautam Srivastava, Brandon University; Reza M. Parizi, Kennesaw State University; Ali Dehghantanha, Hadis Karimipour, University of Guelph; Somayeh Razaghi Karizno, Shahid Bahonar University of Kerman

1247366

5 Sum Inverse Energy Efficiency Minimization for Multiple Links with Time Sharing

Zijian Wang, Luc Vandendorpe, Université catholique de Louvain

7E: Green Communications V

1246960

1 A Light Blockchain-Powered Privacy-Preserving Organization Scheme for Ride Sharing Services

Mohamed Baza, Mohamed Mahmoud, Tennessee Tech University; Gautam Srivastava, Brandon University; Waleed Alasmari, Umm Al-Qura University; Mohamed Younis, University of Maryland

1247874

2 Association and Scheduling in Energy Harvesting Networks: Age of Information and Fairness Trade-off

Zoubeir Mlika, Oussam Khalifeh, Wessam Ajib, Université du Québec a Montréal

1246190

3 Energy-Efficient Precoder Design for URLLC-Enabled Downlink Multi-User MISO Networks Using Finite Blocklength Codes

Keshav Singh, University College Dublin; Meng-Lin Ku, National Central University; Mark Flanagan, University College Dublin

Track 8: IoT, M2M, Sensor Networks, and Ad-Hoc Networking

8A: Cellular IoT

1247426

1 Burst error analysis of scheduling algorithms for 5G NR URLLC periodic deterministic communication

Johannes Demel, Carsten Bockelmann, Armin Dekorsy, University of Bremen

1247314

2 Jitter Suppression for Very Low Latency Feedback Control Over NR

Torbjörn Wigren, Ying Sun, Ericsson AB; Ramon A Delgado, Katrina Lau, Richard H Middleton, University of Newcastle, Australia

1245170

3 Multi-RAT Random Access Scheme Utilising Combined Licensed and Unlicensed Spectrum for Massive Machine-Type Communications

Che-Wei Hsu, Kallol Das, Ljupco Jorguleski, TNO

1248976

4 NR-WLAN Aggregation: Architecture for Supporting URLLC in 5G IoT Networks

Yoshiaki Ohta, Ryuichi Takechi, Fujitsu Limited; Hiroki Takahashi, Ryu Atsuta, Mobile Techno Corp.

1248106

5 Optimized 3D Drone Placement and Resource Allocation for LTE-Based M2M Communications

Ahmed Fahim, Yasser Gadallah, The American University in Cairo

8B: Sensor Networks

1245804

1 A Novel Cross-layer Mobile Data-gathering Protocol for Underwater Sensor Networks

Faisal Alfouzan, Glasgow Caledonian University; Seyed Mohammad Ghoreyshi, University of Southampton; Alireza Shahrabi, Mahsa Sadeghi Ghahroudi, Glasgow Caledonian University

1250082

2 Cost-efficient Underwater Acoustic Sensor Networks for Internet of Underwater Things

Yujae Song, Korea Institute of Ocean Science and Technology; HuiCheol Shin, Korea Maritime and Ocean University

1246224

3 Experimental Demonstration of AoA Estimation Uncertainty for IoT Sensor Networks

Shaghayegh Monfared, Université Libre de Bruxelles; Trung-Hien Nguyen, Université libre de Bruxelles; Thomas Van der Vorst, Université libre de Bruxelles and Sorbonne Université; Philippe De Doncker, Francois Horlin, Université Libre de Bruxelles

1247672

4 Stochastic Encoding based Distributed Blind Estimation for Deterministic Vector Signal

Wentao Zhang, Li Chen, Weidong Wang, University of Science and Technology of China

1247090

5 Voronoi-Based Cooperative Node Deployment Algorithm in Mobile Sensor Networks

Mahsa Sadeghi Ghahroudi, Alireza Shahrabi, Tuleen Boutaleb, Glasgow Caledonian University

8C: Energy Efficiency

1247496

1 A Reliability-Aware Adaptive Greedy-Multicast Routing Protocol for 3D Highly Dynamic Networks

Su Wang, Changle Li, Pengfei Huang, Shuhua Liu, Pincan Zhao, Yuchuan Fu, Xidian University

1247760

2 Age-Energy Tradeoff of Short Packet Based Transmissions in Multicast Networks with ARQ

Mangang Xie, Sun Yat-sen University; Jie Gong, SUN YAT-SEN UNIVERSITY; Xiao Ma, Sun Yat-sen University

1247444

3 Buffer-Aware Scheduling for UAV Relay Networks with Energy Fairness

Yousef, Cister research center; Kai Li, CISTER Research Unit; Eduardo Tovar, Cister research center

1249068

4 Energy-Efficient Task Offloading for Vehicular Edge Computing: Joint Optimization of Offloading and Bit Allocation

Youngsu Jang, Jinyeop Na, KAIST; Seongah Jeong, Kyungpook National University; Joonhyuk Kang, KAIST

1243854

5 Wirelessly Powered Data Aggregation via Intelligent Reflecting Surface Assisted Over-the-Air Computation

Zhibin Wang, Yuanming Shi, Yong Zhou, ShanghaiTech University

8D: Estimation and Localization

1245176

1 A Pre-processing Algorithm Utilizing a Paired CRLB for TDoA Based IoT Positioning

Ahmed Abdel Ghany, University of Rennes; Bernard Uguen, IETR / CNRS / Université Rennes-I; Dominique Lemur, Université Rennes-I

1247774

2 A Probabilistic Octree Fusion Model for Analytical-Based Observer Fault Detection in LSAVs

Abdul Raoof, Osama Alluhaibi, Stewart Birrell, Matthew Higgins, University of Warwick; Simon Brewerton, Aurrigo/RDM Group

1246230

3 Anchor Selection in Angle-of-Arrival estimation-based localization using Polynomial Chaos Expansions

Thomas Van der Vorst, Université libre de Bruxelles and Sorbonne Université; Trung-Hien Nguyen, Université libre de Bruxelles; Shaghayegh Monfared, Université Libre de Bruxelles; Aziz Benlarbi-Delai, Julien Sarrazin, Sorbonne Université; Francois Horlin, Philippe De Doncker, Université Libre de Bruxelles

1246186

4 Design of BLE 2-Step Separate Channel Fingerprinting

Takahiro Yamamoto, Shigemi Ishida, Ryota Kimoto, Kyushu University; Shigeaki Tagashira, Kansai University; Akira Fukuda, Kyushu University

1247636

5 Kalman Filtering-Aided Hybrid Indoor Positioning System with Fingerprinting and Multilateration

Angela Cristina Eyng, Ohara Kerasauskas Rayel, Elder Oroski, Federal University of Technology-Paraná; João Luiz Rebelatto, UTFPR

8E: Multiple Access I

1248820

1 A Scheduling Scheme for Channel Hopping in Wi-SUN FAN Systems toward Data Throughput Enhancement

Robby Wayong, Ryota Okumura, Keiichi Mizutani, Hiroshi Harada, Kyoto University

1244680

2 An Efficient NPUSCH Receiver Design for NB-IoT System

Aoxiang Qin, Peiran Wu, Sun Yat-sen University; Ruibo Tang, CETC No. 7 Research Institute; Minghua Xia, Sun Yat-sen University

1244988

3 Efficient Decoding of Synchronized Colliding LoRa Signals

Samira Abboud, Université Clermont Auvergne; Nancy El Rachkidy, University Clermont-Auvergne; Alexandre Guittou, Université Clermont Auvergne

1247492

4 Performance Analysis for the CMA/CA Protocol in UAV-based IoT network

Xianzhen Guo, Bin Li, Kebang Liu, Northwestern Polytechnical University

1247306

5 Station Grouping Method for Non-uniform Station Distribution in IEEE 802.11ah based IoT Networks

Maki Shimokawa, Kosuke Sanada, Hiroyuki Hatano, Kazuo Mori, Mie University

8F: Multiple Access II

1249506

1 Adaptive Priority-threshold Setting Strategy for Statistical Priority-based Multiple Access Network

Pai Liu, Chan Wang, Ming Lei, Min Li, Minjian Zhao, Zhejiang University

1248858

2 CCA Threshold Impact on the MAC Layer Performance in IoT Networks

Abderrahman Ben Khalifa, Razvan Stanica, INSA Lyon

1246756

3 IoT via Satellite: Asynchronous Random Access for the Maritime Channel

Federico Clazzer, German Aerospace Center (DLR); Andrea Munari, Institute of Communications and Navigation, DLR

1247612

4 Optimizing Non-Orthogonal Multiple Access in Random Access Networks

Ziru Chen, Illinois Institute of Technology; Yong Liu, South China Normal University; Sami Khairy, IIT; Lin Cai, Yu Cheng, Illinois Institute of Technology; Ran Zhang, Miami University

1249380

5 Random Interleaving Multiplexing based Random Access in IoT-Oriented Satellite Networks

Jingrui Su, Guangliang Ren, Huining Zhang, Xidian University

Track 9: Wireless Networks: Protocols, Security And Services

9A: Advances in Communications I

1249198

1 A Delay-Driven Early Caching and Sharing Strategy for D2D Transmission Network

Zhangnan Wang, Yichen Wang, Lu Wang, Tao Wang, Dongyang Xu, Xi'an Jiaotong University

1249554

2 High-Performance and Resource-Efficient IoT-based Sleep Monitoring System

Nico Surantha, Oei Kurniawan Utomo, Sani Muhamad Isa, Bina Nusantara University

1248988

3 Initial Evaluation of Transmission Timing Control Scheme using Wireless LAN for Smart Factory

Tatsuya Yoshioka, Shinji Yamaguchi, Hiroshi Aoki, Akio Hasegawa, Advanced Telecommunications Research Institute International

1249724

- 4 Open Monitoring Platform for Mobile Broadband**
Wolfgang Hofer, TU Wien

1249542

- 5 Recent Advances in Intent-Based Networking: A Survey**
Engin Zeydan, CTTC; Yekta Turk, Mobile Network Architect,
Istanbul, Turkey

9B: Advances in Communications II

1249288

- 1 Doppler Power Characteristics Obtained from Calibrated Channel State Information for Human Activity Recognition**
Ahmed Abdelgawwad, University of Agder; Andreu Catala, Universitat Politècnica de Catalunya (UPC); Matthias Pätzold, University of Agder

1249576

- 2 Influence of Access Point Location on Dynamic Indoor Radio Channel at 60 GHz**
EL HAJJ Marwan, Gheorghe Zaharia, INSA de Rennes; Ghais El Zein, IETR/INSA de Rennes; Hanna Farhat, Sawsan Sadek, Lebanese University

1248852

- 3 Statistical Characterization of Wireless Interference Signal Based On UWB Spectrum Sensing**
Ramon Adeogun, Gilberto Berardinelli, Aalborg University; Preben Mogensen, Aalborg University, Nokia Bell Labs; Ignacio Rodriguez, Aalborg University

1249830

- 4 Tiny-YOLO object detection supplemented with geometrical data**
Ivan Khokhlov, Ilya Osokin, Egor Davydenko, Ilya Ryakin, Azer Babaev, Vladimir Litvinenko, Roman Gorbachev, Moscow Institute of Physics and Technology

1248040

- 5 Matching Prediction to Communication and Computing for Proactive VR Video Streaming**
Xing Wei, Chenyang Yang, Beihang University

9C: Security

1249368

- 1 A Physical-Layer Security Based on Wireless Steganography Through OFDM and DFT-Precoded OFDM Signals**
Ryohei Yamaguchi, Hideki Ochiai, Junji Shikata, Yokohama National University

1249706

- 2 A SDN/NFV-based Core Network Slicing for Secure Mobile Communication**
Nan Ma, Tsinghua University

1249840

- 3 A Secure Transmission Scheme at The Receiver for Eavesdropping Prevention**
Sinuk Choi, DGIST; Sungmin Han, VSI Inc., Ltd.; Ji-Woong Choi, Daegu Gyeongbuk Institute of Science and Technology

1249808

- 4 Optimal Energy Allocation Against Denial-of-Service Attack in Cache-enabled Wireless Networks**
Ruimeng Gan, Yue Xiao, Jinliang Shao, University of Electronic Science and Technology of China; Xiaotian Zhou, The No. 54 Research Institute of CETC; Wei Xiang, James Cook University

1250198

- 5 Reporting Spectrum Misbehaviour using the IEEE 1609 Security Credential Management System**
Hamed Noori, University of British Columbia; David Michelson, The University of British Columbia; Kevin Henry, ESCRYP

9D: URLLC

1249486

- 1 Adaptive Repetition Control Using Terminal Mobility for Uplink Grant-Free URLLC**
Shinichi Ozaku, Yukiko Shimbo, Hirofumi Suganuma, Fumiaki Machara, Waseda University

1248846

- 2 Admission Control in 5G Networks for the Coexistence of eMBB-URLLC Users**
Nipuni Ginige, Manosha Kapuruhamy Badalge, Nandana Rajatheva, Matti Latva-aho, University of Oulu

1249320

- 3 Channel Quality Feedback Enhancements for Accurate URLLC Link Adaptation in 5G Systems**
Guillermo Pocovi, Ali Esswie, Nokia Bell Labs; Klaus I. Pedersen, Nokia - Bell Labs

1250022

- 4 On URLLC Downlink Transmission Modes for MEC Task Offloading**
Jinfei Wang, Mr; Yi Ma, Na Yi, Rahim Tafazolli, University of Surrey

9E: Wireless Networks I

1249194

- 1 A Novel Pseudonym Linking Scheme for Privacy Inference in VANETs**
Zhang Rui, Xin Wang, Peng Cheng, Peng Cheng, Jiming Chen, Zhejiang University

1247198

- 2 Achieve Practical Secrecy with Vector Perturbation Precoding**
Liutong Du, Lihua Li, Ping Zhang, Yaxian Li, Ji Wu, Beijing University of Posts and Telecommunications

1248220

- 3 Analytic study of packet delay from 4G and 5G system ARQs using Signal Flow Graphs**
Sebastian Lindner, Jon David Kroening, Phuong Nga Tran, Christoph Petersen, Andreas Timm-Giel, Hamburg University of Technology

1245260

- 4 Quality of Service Aware Traffic Management for Aircraft Communications**
David Tomic, KTH Royal Institute of Technology; Sandra Hofmann, Airbus; Mustafa Ozger, KTH Royal Institute of Technology; Dominic Schupke, Airbus; Cicek Cavdar, KTH Royal Institute of Technology

1248576

- 5 Quality of Service Driven Resource Allocation in Network Slicing**
Saibharath S, BITS Pilani, India; Sudepta Mishra, Indian Institute of Technology Ropar; Chittaranjan Hota, BITS Pilani, India

1245116

- 6 SDN-based Misbehavior Detection System for Vehicular Networks**
Abdelwahab Boualouache, Ridha Soua, Thomas Engel, University of Luxembourg

9F: Wireless Networks II

1245154

- 1 High Definition Video Packet Scheduling Algorithms for IEEE802.11ac Networks to Enhance QoE**
Summera Nosheen, Jamil Khan, The University of Newcastle, Australia

1247994

- 2 Impact of Interference Suppression under Ray Tracing and 3GPP Street Canyon Mode**
Muhammad Usman Sheikh, Riku Jäntti, Jyri Hamalainen, Aalto University

1245084

3 On the Inappropriateness of Static Measurements for Benchmarking in Wireless Networks

Vaclav Raida, Philipp Svoboda, Markus Rupp, TU Wien

1247642

4 Physical Layer Security in Vehicular Networks with Reconfigurable Intelligent Surfaces

Abubakar Makarfi, Khaled Rabie, Manchester Metropolitan University; Omprakash Kaiwartya, Nottingham Trent University; Xingwang Li, Henan Polytechnic University; Rupak Kharel, Manchester Metropolitan University

1246062

5 QoS Enhancements for V2X Services in 5G Networks

Riccardo Trivisonno, Qing Wei, Clarissa Cassales Marquezan, Huawei Technologies

1249146

6 LABVS: Lightweight Authentication and Batch Verification Scheme for Universal Internet of Vehicles (UIoV)

Himani Sikarwar, Ankur Nahar, Debasis Das, Indian Institute of Technology Jodhpur Rajasthan

9G: Wireless Networks III

1243932

1 Achievable Secrecy Rate in mmWave Multiple-Input Single-Output Ad Hoc Networks

Ahmed F. Darwesh, Abraham O. Fapojuwo, University of Calgary

1247304

2 CSAI: Open-Source Cellular Radio Access Network Security Analysis Instrument

Thomas Byrd, Vuk Marojevic, Mississippi State University; Roger Piqueras Jover, Bloomberg LP

1247678

3 Physical Layer Security in Multi-User Wireless Networks: Interference Effect on Large Scale Analysis

Seyedmehdi Sadeghzadeh Nokhodberiz, Masoud Salehi, Northeastern University

1246452

4 Secrecy Analysis of UAV-Aided Relaying Systems

Liang Yang, Hunan University; Xiaoqiong Long, Guangdong University of Technology

1247674

5 Suppression of 802.11 Transmission in 2.4GHz ISM band: Method and Experimental Verification

PeiLiang Zuo, Tao Peng, Beijing University of Posts and Telecommunications; Hao Wu, The 7th Research Institute of CETC; Kangyong You, Beijing University of Posts and Telecommunications; Hanbo Jing, Beijing Institute of Remote Sensing Equipment; Wenbin Guo, Wenbo Wang, Beijing University of Posts and Telecommunications

1247360

6 Towards Seamless Producer Mobility in Information Centric Vehicular Networks

Vignesh Sivaraman, Dibyajyoti Guha, Biplab Sikdar, National University of Singapore

Track 10: GPS, Remote Sensing, Security and Non-terrestrial Networks

10A: Positioning and Navigation I

1247542

1 Large Intelligent Surface for Positioning in Millimeter Wave MIMO Systems

Jiguang He, University of Oulu; Henk Wymeersch, Chalmers University of Technology; Long Kong, University of Luxembourg, Luxembourg; Olli Silven, Markku Juntti, University of Oulu

1247534

2 Statistical Beam Information for mmW Positioning

Ramon A Delgado, University of Newcastle, Australia; Torbjörn Wigren, Ericsson AB; Katrina Lau, Richard H Middleton, University of Newcastle, Australia; Iana Siomina, Ericsson AB

1246678

3 Intersymbol Interference Cancellation on Ultra-wideband Impulse Radio Positioning

Xufang Wang, Fujian Normal University; Feng Lin, Fuzhou Institute for Data Technology; Wen-Kang Jia, Fujian Normal University

1249696

4 Metropolitan Field Trial of Fingerprint-based Localization Utilizing Residual of Received-Signal-Strength

Jun Sakai, NEC; Takafumi Yanaga, Kohta Sugaya, NEC Platforms Ltd; Shinya Kurumatani, NEC

1247720

5 Fast Loop Closures Detection Method for Geomagnetic Signal and Lidar Fusion

Beizhang Chen, University of Chinese Academy of Sciences; Li Huiyun, Shenzhen Institutes of Advanced Technology, CAS

1247694

6 Reliable Graph-Slam Framework to Generate 2D LIDAR Intensity Maps for Autonomous Vehicles

Mohammad Amro Aldibaja, Kanazawa University

10B: Positioning and Navigation II

1248478

1 Performance of High-Accuracy Phase-Based Ranging in Multipath Environments

Pepijn Boer, Jac Romme, Jochem Govers, Guido Dolmans, Imec-NL

1248490

2 Practical Evaluation of Smartphone-based Multi-Floors Indoor Positioning System using Enhanced Pedestrian Dead Reckoning and Map Calibration

Jing-Wen Liu, Jun-Bang, Jiang, Shao-Yung Huang, Kuan-Wu Su, Min-Chieh Yu, Jenq-Shiou Leu, National Taiwan University of Science and Technology

1245132

3 Bag-of-Visual Words based Improved Image Retrieval Algorithm for Vision Indoor Positioning

Shuang Jia, Lin Ma, Xuezhi Tan, Harbin Institute of Technology; Danyang Qin, Heilongjiang University

1248068

4 A method of Monocular Visual Odometry Combining Feature points and Pixel Gradient for Dynamic Scene

Panwei Li, University of Chinese Academy of Sciences

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5 Visible Light Indoor Positioning Algorithm Base on the Fruit Fly Modified DV-hop Method

Yuexia Zhang, Shengwang Yin, Jiacheng Jin, Beijing Information Science and Technology University

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1 Clutter removal for Wi-Fi-based passive bistatic radar

Laurent Storrer, Hasan Can Yildirim, Université Libre de Bruxelles; Claude Desset, imec; Marc Bauduin, IMEC; Francois Horlin, Université Libre de Bruxelles; Andre Bourdoux, IMEC

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- 2 IP3/DR - A low-cost precise and robust GNSS/INS integrated navigation system for land vehicles**
Hongzhou Yang, Haiyu Lan, Fei Liu, Yang Gao, Naser Elsheimy, Profound Positioning Inc.

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- 3 Iterative Bayesian-based Localization Mechanism for Industry Verticals**
Henrique Hilleshein, Carlos Lima, Hirley Alves, Matti Latva-aho, University of Oulu

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- 4 Relative Positioning of Autonomous Systems using Signals of Opportunity**
Nicolas Souli, University of Cyprus; Panayiotis Kolios, KIOS Research and Innovation Center of Excellence; George Ellinas, University of Cyprus

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- 5 Sector Fitting - A Novel Positioning Algorithm for Sectorized Transmitters**
Simon Sundberg, Johan Garcia, Karlstad University

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Nestor Hernandez, Jonas Gabs Fugl Nørby, Rune Hylsberg Jacobsen, Aarhus University

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- 2 An Optimization Method for the Gateway Station Deployment in LEO Satellite Systems**
Chaoyi Zhu, Yitao Li, Manqing Zhang, Qi Wang, Zhou Wuyang, University of Science and Technology of China

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- 3 A Study on Signal Band Division Interference Canceller for HAPS Feeder Links with Multi-Gateways**
Takafumi Fujii, Yoshichika Ohta, Teruya Fujii, Softbank Corp.

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- 4 Ka-band Based Channel Modeling and Analysis in High Altitude Platform(HAP) System**
Jiarui Zhao, Qi Wang, Yitao Li, University of Science and Technology of China; Jiaxi Zhou, the 38th Research Institute of China ETGC; Zhou Wuyang, University of Science and Technology of China

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- 5 TEPLITS: A comprehensive Test Platform for Intelligent Transportation Systems**
Florian Alexander Schiegg, Shuo Li, Nikolay Mikhaylov, Robert Bosch GmbH

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- 1 A Scheme on Pedestrian Detection using Multi-Sensor Data Fusion for Smart Roads**
Hui Wang, Changle Li, Yao Zhang, Zhao Liu, Xidian University; Yilong Hui, Shanghai University; Guoqiang Mao, University of Technology, Sydney

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- 2 A Stereo Perception Framework for Autonomous Vehicles**
Narsimlu Kemsaram, Anweshan Das, Gijs Dubbelman, Eindhoven University of Technology

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- 3 GAN-CRT: A Novel Range-Doppler Estimation Method in Automotive Radar Systems**
Yun-Han Pan, National Chiao Tung University, Taiwan, R.O.C.; Chia-Hung Lin, Ta-Sung Lee, National Chiao Tung University

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- 4 Model Predictive Motion Planning for Autonomous Vehicle in Mid-high Overtaking Scene**
Yang Xiaoyu, Li Huiyun, Shenzhen Institutes of Advanced Technology, CAS

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- 5 On-Road Object Identification with Time Series Automotive Millimeter-wave Radar Information**
Takashi Nakamura, Keio University; Kentaroh Toyoda, Singapore Institute of Manufacturing Technology, A*STAR; Tomoaki Ohtsuki, Keio University

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Ziran Wang, Toyota Motor North America, InfoTech Labs; Xishun Liao, Xuanpeng Zhao, University of California, Riverside; Kyungtae Han, Prashant Tiwari, Toyota Motor North America, InfoTech Labs; Matthew J. Barth, Guoyuan Wu, University of California, Riverside

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Marek Bachmann, Michel Morold, University of Kassel; Sebastian Engel, AUDI AG; Johann Götz, Klaus David, University of Kassel

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- 3 Modeling the Impact of Traffic Signals on V2V Information Flow**
Jungyeol Kim, Rohan Saraogi, Saswati Sarkar, Santosh S. Venkatesh, University of Pennsylvania

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- 4 On the Application of Machine Learning for Cut-in Maneuver Recognition in Platooning Scenarios**
Afaf Bouhoute, Mohamed Mosbah, Akka Zemmari, University of Bordeaux

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Amr Ibrahim, Inaki Martin Soroa, Eindhoven University of Technology; Hong Li, NXP Semiconductors; Dip Goswami, Twan Basten, Eindhoven University of Technology

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Muhammad Shamooun Saleem, Bertrand Neckarsulm GmbH (Ingolstadt University of Applied Sciences)

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- 2 Electronic Differential System for an Electric Vehicle with Four In-wheel PMSM**
Merve Yıldırım, Hasan Kürüm, University of Firat

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- 3 Estimating Environmental Parameters in Connected Electric Powertrains using Set-Membership Filtering**
Arian Ahmadi, University of Notre Dame

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4 Simulation of an electric vehicle to study the impact of cabin heating on the driving range

David Ramsey, Alain Bouscayrol, Université de Lille; Loïc Boulon, Université du Québec à Trois-Rivières (Canada); Alexandre Vaudrey, University of Lyon

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5 SoC estimation of LFP Battery Based on EKF Observer and a Full Polynomial Parameters-Model

Baccouche Ines, University of Sousse

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1 A Time-delay Neural Network of Sideslip Angle Estimation for In-wheel Motor Drive Electric Vehicles

Jizheng Liu, Zhenpo Wang, Lei Zhang, Beijing Institute of Technology

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2 Benchmarking Alternative Technologies for providing Voice Services onboard Trains

Herman Mikkelsen, Rikard Reinhold, Mats Karlsson, Icomera; Claes Beckman, KTH Center for Wireless Systems, Wireless@KTH

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3 Electric Vehicles Charging Scheduling Optimization for Total Elapsed Time Minimization

Liping Qian, Xinyue Zhou, Ningning Yu, Zhejiang University of Technology; Yuan Wu, University of Macau

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4 Traffic Simulation of Connected and Autonomous Freight Vehicles to Increase Traffic Throughput via Road Tunnel Networks

Kushagra Bhargava, Matthew David Higgins, Paul Jennings, University of Warwick; Kum Wah Choy, Costain Ltd.

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5 Vehicle Trajectory Estimation based on Dynamic Bayesian Networks

Pedro Rio, Rodolfo Oliveira, Universidade Nova de Lisboa/Instituto de Telecomunicações

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1 DARE: A Reports Dataset for Global Misbehavior Authority Evaluation in C-ITS

Farah Haidar, Renault; Joseph Kamel, IRT-SystemX; Ines BEN JEMAA, Arnaud Kaiser, IRT SystemX; Brigitte Lonc, Renault; Pascal Urien, Télécom paristech

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2 Impact of Imperfect Communication on Cooperative Vehicular Maneuvering at Intersections

Daniel Bischoff, Technical University Darmstadt; Florian Alexander Schiegg, Robert Bosch GmbH; Tobias Meuser, Ralf Steinmetz, Technical University Darmstadt

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3 Latency assessment of an ITS safety application prototype for protecting crossing pedestrians

Guido A. Gavilanes Castillo, Edoardo Bonetto, Daniele Brevi, Francesco Scappatura, Anooq Sheikh, Riccardo Scopigno, LINKS Foundation

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4 MEC-based infotainment services for smart roads in 5G environments

Dario Sabella, Intel Deutschland GmbH; Daniele Brevi, Edoardo Bonetto, LINKS Foundation; Dario Salerno, Vivida; Anurag Ranjan, Intel Corporation; Antonio Manzalini, Telecom Italia Mobile

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5 Platoon-based Cooperative Intersection Management Strategies

Neha Bisht, Indian Institute of Technology Roorkee; Ravi Avinash Shet, Leibniz University of Hannover

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1 Night Time Vehicle Detection and Tracking by Fusing Sensor Cues from Autonomous Vehicles

Xinxiang Zhang, Brett Story, Dinesh Rajan, Southern Methodist University

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2 On Urban Traffic Flow Benefits of Connected and Automated Vehicles

Ioannis Mavromatis, Toshiba Research Europe Limited; Andrea Tassi, Robert Piechocki, University of Bristol; Mahesh Sooriyabandara, Toshiba Research Europe Limited

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3 P2C2: Peer-to-Peer Car Charging

Prabuddha Chakraborty, Robert Courtland Parker, Tamzidul Hoque, Jonathan Cruz, Swarup Bhunia, University of Florida

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4 Predictive Quality of Service: Adaptation of Platoon Inter-Vehicle Distance to Packet Inter-Reception Time

Andreas Pfadler, Guillaume Jornod, Ahmad El Assaad, Volkswagen AG; Peter Jung, Technical University of Berlin

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Wojciech Baron, Friedrich-Alexander-Universität Erlangen-Nürnberg; Christoph Sippl, Audi AG; Kai-Steffen Hielscher, Friedrich-Alexander-Universität Erlangen-Nürnberg; Reinhard German, University of Erlangen-Nürnberg

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1 A Simultaneous Attack Scenario Generation Method Using the Parallel Behavior Model

Toshiyuki Fujikura, dSPACE Japan K.K.; Ryo Kurachi, Nagoya University

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2 Experimental assessment of wheel-terrain interaction model suitability and applicability

Yuewei He, Yongkun Zhao, Lihang Feng, Wenjun Zhu, Zi Wang, Nanjing Tech University

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3 Secure Virtual Resource Allocation in Heterogeneous Networks for Intelligent Transportation

Haocong Cao, Shengchen Wu, Nanjing University of Posts and Telecommunications; Yue Hu, China Mobile Group Jiangsu Co., Ltd.; Feng Tian, Longxiang Yang, Nanjing University of Posts and Telecommunications

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4 Wireless Healthcare System for Life Detection and Vital Sign Monitoring

Lili Xie, Fujitsu Research and Development Center Co., Ltd.; TIAN Jun, Fujitsu R&D Center; Hongchun Li, Fujitsu Research and Development Center Co., Ltd, Beijing; Qian Zhao, Fujitsu Research and Development Center Co., Ltd.

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Azusa Danjo, Atsuki Murata, Shinsuke Hara, Osaka City University; Takahiro Matsuda, Tokyo Metropolitan University; Fumie Ono, NICT

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2 Energy-Efficient Transmit Power and Straight Trajectory Optimization in UAV-Aided Wireless Sensor Networks

Yue Ma, China Aerodynamics Research and Development Center; Tangyanqun, School of Electronics and Communication Engineering; Jia Tao, China Aerodynamics Research and Development Center; Di Zhang, Zhengzhou University; Siyu Tao, NDSC; Wei Li, National University of Defense Technology, China

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- 3 Extracting the fundamental diagram from aerial footage**
Rafael Makrigiorgis, Panayiotis Kolios, KIOS Research and Innovation Center of Excellence; Stelios Timotheou, Theo Theocharides, University of Cyprus; Christos G. Panayiotou, KIOS Research Center for Intelligent Systems and Networks,

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- 4 Resource Awareness in Unmanned Aerial Vehicle-Assisted Mobile-Edge Computing Systems**
Xianfu Chen, Tao Chen, VTT Technical Research Centre of Finland Ltd.; Zhifeng Zhao, Zhejiang Lab; Honggang Zhang, Zhejiang University; Mehdi Bennis, University of Oulu; Yusheng Ji, National Institute of Informatics

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- 5 UPFlight: An enabler for Avionic MEC in a drone-extended 5G mobile network**
Umberto Fattore, NEC Laboratories Europe GmbH \ Universidad Carlos III de Madrid; Marco Liebsch, NEC Laboratories Europe GmbH; Carlos J. Bernardos, Universidad Carlos III de Madrid

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Xabier Insausti Sarasola, University of Navarra; Bjorn Hogstad, Norwegian University of Science and Technology; Matthias Pätzold, University of Agder

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- 2 On the Design of a High-Throughput Communication Link for Short-Range UAVs Operating in Dense Urban Environment**
Rafal Krenz, Michal Sybis, Pawel Sroka, Krzysztof Wesołowski, Poznan University of Technology

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- 3 Optimized tour planning for drone-based urban traffic monitoring**
Chrystalleni Christodoulou, University of Cyprus; Panayiotis Kolios, KIOS Research and Innovation Center of Excellence

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- 4 Towards the Development of a Robust Path Planner for Autonomous Drones**
Gopi Gagan, Anwar Haque, University of Western Ontario

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- 5 Unmanned Aerial Vehicles for Package Delivery and Network Coverage**
Mohammadjavad Khosravi, Hossein Pishro-Nik, University of Massachusetts, Amherst

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- 1 A Study of Co-Channel Spectrum-Sharing System between HAPS and Terrestrial Mobile Communication Networks**
Mitsukuni Konishi, Takuya Nishimaki, SoftBank Corp.; Yohei Shibata, HAPSMobile Inc.; Sho Nabatame, Atsushi Nagate, SoftBank Corp.

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- 2 Development and Experimental Verification of Autonomous Collision Risk Avoidance System for UAV based on Device-to-Device Communication**
Fumie Ono, Toshinori Kagawa, Lin Shan, Ryu Miura, Fumihide Kojima, National Institute of Information and Communications Technology; Katsuhiko Yokota, Tokyo Denki University

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- 3 Efficient and coordinated vertical takeoff of UAV swarms**
Francisco Fabra, Jamie Wubben; Carlos T. Calafate, Juan-Carlos Cano, Pietro Manzoni, Universitat Politècnica de València (UPV)

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- 4 Optimal UAV Positioning for Terrestrial Users**
Leila Nasraoui, Sup'Com; Sumit, Roy, University of Washington

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- 5 Positioning of Multiple Unmanned Aerial Vehicle Base Stations in Future Wireless Network**
Thushan Sivalingam, Manosha Kapuruhamy Badalge, Nandana Rajatheva, University of Oulu; Maheshi Buddhinee Dissanayake, University of Peradeniya; Matti Latva-aho, University of Oulu

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- 1 A Directional Clustering Protocol for Millimeter Wave Vehicular Ad hoc Networks**
Mohammed Bahbahani, PAAET; Emad Al-Susa, Manchester University

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- 2 An Efficient Coordinator Selection Method for Geo-Routing Protocol in Vehicular Network**
Farzana Shabnam, BRAC University; Abbas Jamalipour, The University of Sydney

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- 3 Delay-Minimization Link Selection for Heterogeneous VLC-DSRC VANETs**
Kaixuan Ji, Yuhang Dong, Jiaxuan Chen, Tianqi Mao, Zhaocheng Wang, Tsinghua University

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- 4 Multi-hop relaying in mmWave band for next generation train radio**
Qianrui Li, Nicolas Gresset, Mitsubishi Electric R&D Centre Europe

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- 5 Multiple Channel Access using Deep Reinforcement Learning for Congested Vehicular Networks**
Chungjae Choe, Junsung Choi, Jangyong Ahn, Dongryul Park, Seungyoung Ahn, Korea Advanced Institute of Science and Technology

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- 1 Communication-Efficient Optimal Control Design for Distributed Control Systems in Cooperative Vehicular Networks**
Myung (Michael) Cho, Penn State Behrend; Abdallah Abdallah, Penn State Erie - The Behrend College

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- 2 Cooperative Awareness Message Dissemination in EN 302 637-2: an Adaptation for Winding Roads**
Juan Aznar Poveda, Esteban Egea-Lopez, Antonio-Javier García-Sánchez, Universidad Politécnica de Cartagena

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- 3 CVS: Design, Implementation, Validation and Implications of a Real-world V2I Prototype Testbed**
Alessandro Marchetto, CRF; Panagiotis Pantazopoulos, Institute of Communications and Computer Systems (ICCS); Andras Varadi, Commsignia Ltd; Silvia Capato, Swarco Mizar; Angelos Amditis, ICCS

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- 4 Efficient Vehicular Crowdsourcing Models in VANET for Disaster Management**
Lebre, Université Clermont Auvergne

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- 5 Redundancy Mitigation in Cooperative Perception for Connected and Automated Vehicles**
Gokulnath Thandavarayan, Miguel Sepulcre, Javier Gozálviz, Universidad Miguel Hernandez de Elche (UMH)

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- 1 Dynamic Control of Transmission Interval for Efficient Pedestrian-to-Vehicle Communication Based on Channel Utilization Rate**
Shun Ito, Suhua Tang, Sadao Obana, The University of Electro-Communications

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- 2 Exploiting Large Vehicles with High Antenna for Efficient Relay in Inter-Vehicle Communication**
Takuya Mori, Suhua Tang, Sadao Obana, The University of Electro-Communications

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- 3 Full-Duplex Store-Carry-Forward scheme for Intermittently Connected Vehicular Networks**
Ali Siddig, American University of Sharjah; Ahmed S. Ibrahim, Florida International University; Mahmoud H. Ismail, American University of Sharjah

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- 4 Virtual Subcarrier Aided Channel Estimation Schemes for Tracking Rapid Time Variant Channels in IEEE 802.11p Systems**
Seunggho Han, Jinsu Park, Changick Song, Korea National University of Transportation

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- 1 5G V2X Communication at Millimeter Wave: Rate Maps and Use Cases**
Wenqing Zheng, Anum Ali, Nuria Gonzalez-Prelcic, Robert W. Heath Jr., Aldebaro Klateau, The University of Texas at Austin; Ehsan Moradi Pari, Honda US R&D

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- 2 A New Mode Selection and Resource Reuse Strategy for V2X in Future Cellular Networks**
Haider, Student; Jordi Pérez-Romero, Universitat Politècnica de Catalunya

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- 3 Codebook Performance Evaluation of mmWave in Train Communications**
Stavros Typos, Vaia Kalokidou, Simon Armour, Angela Doufexi, Evangelos Mellios, Andrew Nix, University of Bristol

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- 4 Conception and Realization of a Mobile HiL Test Bench for V2X Communication**
Soeren Scherler, Xiaobo Liu-Henke, Ostfalia University of Applied Sciences

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- 5 Empirical Investigation of SDR-based DSRC Communication**
Steven Knowles Flanagan, Xiaohong Peng, Jianhua He, Irfan Yusoff, Aston University

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- 6 Impacts of Channel Loss and Electromagnetic Interference on Intra-Vehicle Wireless Communications**
Irfan Yusoff, Xiaohong Peng, Aston University

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- 1 Link Level Performance Comparison of C-V2X and ITS-G5 for Vehicular Channel Models**
Raja Sattiraju, Donglin Wang, Technical University of Kaiserslautern; Andreas Weinand, Hans Schotten, University of Kaiserslautern

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- 2 Neural Network Equalisation and Symbol Detection for 802.11p V2V Communication at 5.9GHz**
Scott Stainton, Newcastle University; Waseem Ozan, UCL; Martin Johnston, Satnam Dlay, Paul Anthony Haigh, Newcastle University

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- 3 Performance comparison between LTE-V2X and ITS-G5 under realistic urban scenarios**
Mouna Karoui, Antonio Freitas, University Clermont Auvergne; Gérard Chalhoub, Université Clermont Auvergne

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- 4 QoS Evaluation and Prediction for C-V2X Communication in Commercially-Deployed LTE and Mobile Edge Networks**
Luis Torres Figueroa, Henning Schepker, Josef Jiru, Fraunhofer ESK

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- 5 Vehicle to Infrastructure VLC Channel Models**
Xiaotong Shen, Harald Haas, University of Edinburgh

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- 1 C-ITS data completion to improve unsupervised driving profile detection**
Brice Leblanc, Seçil Ercan, Université de Reims Champagne-Ardenne; Cyril de Runz, BDTLN, LIFAT, University of Tours

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- 2 C-V2X Resource Deployment Architecture Based on Moving Network Convoys**
Venkatnarayanan Lakshminarasimhan, Alois Knoll, Technische Universität München

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- 3 CVIN: Connected Vehicle Information Network**
Nikhil Prakash, David Michelson, The University of British Columbia; Chen Feng, University of British Columbia Okanagan

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- 4 DENM Repetitions to Enhance Reliability of the Autonomous Mode in NR V2X Sidelink**
Francesco Romeo, L2S, CentraleSupélec-CNRS-Université Paris-Saclay; Claudia Campolo, Università Mediterranea di Reggio Calabria; Antonella Molinaro, University 'Mediterranea' of Reggio Calabria; Antoine Berthet, L2S, CentraleSupélec-CNRS-Université Paris-Saclay

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- 5 Experimental Analysis of Safety Application Reliability in V2V Networks**
Biplav Choudhury, Vijay Shah, Avik Dayal, Jeffrey Reed, Virginia Tech

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- 1 Adaptive Sampling for the Optimal Signal Reconstruction of Vehicle Telematics**
Jie Ren, Yong Li, Kan Tang, Shuai Sun, Xuewei Wang, Chiaruei Liu, Cummins

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- 2 Collaborative and distributed mechanisms for traffic jams detection and control using VANETs**
Bruno Cunha Farias, Carlos Alberto Vieira Campos, Federal University of the State of Rio de Janeiro

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- 3 Combinatorial Optimization-based Task Allocation Mechanism for Vehicular Clouds**
Joahannes Costa, University of Campinas; Rodolfo I. Meneguette, University of São Paulo; Denis Rosario, Federal University of Pará (UFPA); Leandro Villas, Institute of Computing - University of Campinas

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- 4 Leader selection in Vehicular Ad-hoc Networks: a Proactive Approach**
Rusheng Zhang, Carnegie Mellon University; Baptiste Jacquemot, Kagan Bakirci, Sacha Bartholme, Killian Kaempf, Baptiste Freydt, Loic Montandon, Ecole Polytechnique Federale de Lausanne; Shenqi Zhang, Ozan Tonguz, Carnegie Mellon University

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- 5 NDNIDS: An Intrusion Detection System for NDN Based VANET**
Praveensankar Manimaran, National Institute of Technology Puducherry; Arun Raj Kumar P, National Institute of Technology Calicut

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1 Blockchain-based Information Sharing between Smart Vehicles for Safe Driving

Im Y. Jung, Kyungpook National University

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2 Bumblebee-Inspired C-V2X Dynamic Spectrum Access Testbed Using OpenAirInterface

Kuldeep S. Gill, Kevin N. Heath, Sreeshti Chukey, Aneela Haider, Robert J. Gegeer, Elizabeth F. Ryder, Alexander Wyglinski, Worcester Polytechnic Institute

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3 Degree Centrality-based Caching Discovery Protocol for Vehicular Named-Data Networks

Lucas Borges Rondon, Joahannes Costa, University of Campinas; Geraldo P. Rocha Filho, University of Brasilia; Denis Rosario,

Federal University of Pará (UFPA); Leandro Villas, University of Campinas

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4 Guidelines for Simulating/Emulating Software-Defined Networks in Connected Vehicles

David Franco, Marina Aguado, Nerea Toledo, Marivi Higuero, University of the Basque Country

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5 Is Packet Dropping a Suitable Congestion Control Mechanism for Vehicular Networks?

Miguel Sepulcre, Jorge Mira, Gokulnath Thandavarayan, Javier Gozávez, Universidad Miguel Hernandez de Elche (UMH)

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