Final Program

VTC2020-Fall

2020 IEEE 92nd Vehicular Technology Conference

18 November – 16 December 2020

Online Virtual Conference
Welcome from the General Chair

On behalf of the entire IEEE VTC2020-Fall Organizing Committee I warmly welcome you to this second virtual edition of the Vehicular Technology Conference, the flagship conference of the IEEE Vehicular Technology Society. After very careful analysis of the extraordinary circumstances created by the global pandemic, the Board of Governors of the Society has decided to hold the conference again in a virtual format to ensure your physical safety in these trying times of still not very well known dangers to the well-being of us all. This is not a perfect solution, but the best possible under the current difficult circumstances. We all hope that in spite of this unconventional conference format you will still very much benefit from the intellectually stimulating technical program that the Organizing Committee has prepared for you. We also hope that when this global pandemic is finally behind us, we will be able to welcome you to a future regular-format VTC in beautiful Victoria.

The cutting-edge technologies that are within the scope of our conference are of essential importance to enhancing the quality of our daily lives and to making our economy more efficient and sustainable. One example is 5G systems and networks that are being deployed at an increasing pace worldwide. Their different use cases have a potential of impacting all areas of human activity to the degree that still at this time is not easy to predict or even imagine. Their progressing evolution into the future 6G systems and networks creates challenges that need to be addressed by new ground-breaking directions of research emerging in both industrial and academic environments. We believe the technical program of our conference contains numerous and extensive samples of such research efforts.

The virtual format of the VTC 2020-Fall will provide an efficient platform for exchange of new ideas in our area of research interest and expertise. We will assemble via the marvel of our global telecommunication network to discuss the latest research results of interest to our professional community. Our discussions will focus on 350 technical papers, multiple keynote sessions, highly relevant and informative tutorials, and leading-edge workshops.

The IEEE Vehicular Technology Conference has a long and remarkable history. For the past seven decades the VTC has established itself as the prominent conference in the areas of wireless communications and networks, vehicular electronics and transportation systems. This year the VTC2020-Spring and our VTC2020-Fall are making history as the first two IEEE Vehicular Technology Conferences to be held in a remote on-line format.

Once again, welcome to our conference. I hope you will enjoy it and benefit from it in spite of not being able to visit our beautiful Victoria in person.

Witold Krzymień
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 92nd IEEE Vehicular Technology Conference (VTC2020-Fall) that will be, for the sake of safety and health of all participants, organized in a virtual online format.

This 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. We received a total of 722 paper submissions, out of which 350 outstanding papers will be presented in 12 technical tracks and the recent results track that comprise the IEEE VTC2020-Fall technical program. In addition to the regular and recent results sessions, the conference will feature 10 topical workshops, 10 tutorials delivered by the leading experts in the field, and four extraordinary keynote speakers, one of them is from industry and the other three are from the academia.

We would like to use this opportunity to thank all 13 track co-chairs for their excellent work. They all managed to obtain at least 3 reviews for each paper within a short time frame, and the decision process went extremely smoothly. We would like to thank the members of the IEEE VTC2020-Fall organizing committee for their great responsiveness and support during the entire period of technical program preparation and development. We would also like to thank the technical program committee (TPC) members for their diligent work. 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!

Lin Cai and Vincent Wong
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 92nd Vehicular Technology Conference – VTC2020-Fall. The conference also marks our second VTC to be held virtually.

This year’s Fall 2020 edition of the Vehicular Technology Conference series will provide attendees with a magnificent collection of technical paper presentations, tutorials, plenary talks, and workshops, all on a virtual platform. With the continuation of COVID-19 global health crisis, the VTS Board of Governors has decided to again convert IEEE VTC2020-Fall, originally planned to be held in the beautiful city of Victoria, Canada, to a fully virtual conference with the original dates, 4-7 October 2020. We will however extend the virtual conference availability dates until end of November 2020 so attendees from different parts of the world could access the rich program at their own convenient time. We do realize that virtual conference will not allow to reproduce the professional networking environment that you are used to, but it will allow VTC2020-Fall 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 peer-reviewed 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-Fall 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 Witold Krzymień, Technical Program Co-chairs Lin Cai and Vincent Wong, and the rest of the conference organizing team for their time, effort, dedication, and commitment for making VTC2020-Fall 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 in person at VTC2021-Spring in Helsinki, Finland, where we will be Connecting the Mobile World! Stay safe.

Abbas Jamalipour, President
IEEE Vehicular Technology Society

Organizing Committee

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Mohamed M. A. Moustafa,
Bingxian Mu,
Andrea Munari,
Zahra Naghsh,
Kevin Navau,
Derrick Wing Kwan Ng,
A range of tutorials will be held given by experts from industry and academia.

T1: Wireless 2.0: Wireless Networks Empowered by Reconfigurable Intelligent Surfaces
Marco Di Renzo, Paris-Saclay University (CNRS & CentraleSupelec), France

Wireless networks 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 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.

This tutorial will cover the emerging wireless vision, the enabling technologies, the most recent theoretical and experimental advances, and the most promising applications envisioned for RISs in wireless networks.

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 a 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, CentraleSupelec, 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 EAI SEE-IEEE Alain Glavieux Award, the 2018 IEEECOMSOC Young Professional in Academy Awards, and 8 Best Paper Awards at IEEE conferences (2012 and 2014 IEEE CAMAD, 2013 IEEE VTC-Fall, 2014 IEEE ATC, 2015 IEEE ComManTel, 2017 IEEE SigTelCom, EAI 2018 INISCOM, IEEE ICC 2019). He has been a highly cited researcher according to Clarivate Analytics and Web of Science, and a Fellow of the IEEE.

T2: Wireless Transmission for Advanced Internet of Things: A Unifying Data-Oriented Approach
Hong-chuan Yang, University of Toronto, Canada; Mohamed-Slim Alouini, King Abdullah University of Science and Technology (KAUST), Saudia Arabia

Wireless communication systems will play an essential role in data transmission for future Internet of Things (IoT). The design and optimization of wireless transmission strategies for diverse IoT applications that generate data of variable sizes and dramatically different quality of service requirements are of critical contemporary

Tutorials
interest. In this proposed tutorial, we present a unique data-oriented approach for wireless transmission system design, specifically targeting vertical IoT applications that demand ultra-reliable low-latency and extremely high energy efficiency. We introduce novel data-oriented metrics to characterize the theoretical performance limits for various transmission scenarios. These performance metrics are applied to the analysis and design of practical transmission schemes. The data-oriented approach offers important new insights and leads to interesting new directions. Through this tutorial, the attendees obtain a broad new perspective to the analysis and optimization of wireless transmission technologies for advanced IoT applications.

Dr. Hong-Chuan Yang (Senior Member IEEE) received the Ph.D. degree in electrical engineering from the University of Minnesota in 2003. He is a professor of the Department of Electrical and Computer Engineering at the University of Victoria, Canada. From 1995 to 1998, he was a Research Associate at the Science and Technology Information Center (STIC) of the Ministry of Posts & Telecom (MPT), Beijing, China. His current work mainly focuses on different aspects of wireless communications, with special emphasis on channel modeling, diversity techniques, system performance evaluation, cross-layer design, and energy-efficient communications. He has published over 250 journal and conference papers. He is the author of the book "Introduction to Digital Wireless Communications" by IET press and the co-author of the book Advanced Wireless Transmission Technologies by Cambridge University Press.

Dr. Mohamed-Slim Alouini (Fellow IEEE) received the Ph. D. degree in electrical engineering from the California Institute of Technology (Caltech) in 1998. He also received the Habilitation degree from the Universite Pierre et Marie Curie in 2003. Dr. Alouini started his academic career at the University of Minnesota in 1998. In 2005, he joined Texas A&M University at Qatar, Doha, and in 2009, he was appointed as Professor of Electrical Engineering at KAUST, Thuwal, Makkah Province, Saudi Arabia, where he is responsible for research and teaching in the areas of Communication Theory and Applied Probability. More specifically, his research interests include design and performance analysis of diversity combining techniques, MIMO techniques, multi-hop/cooperative communications systems, cognitive radio systems, and multiresolution, hierarchical and adaptive modulation schemes. Dr. Alouini has published several papers on the above subjects, and he is co-author of the textbook Digital Communication over Fading Channels published by Wiley Interscience. He is a Fellow of the IEEE, a member of the Thomson ISI Web of Knowledge list of Highly Cited Researchers, and a co-recipient of best paper awards in eight IEEE conferences (including ICC, GLOBECOM, VTC, and PIMRC).

T3: Towards AI-enabled Air-ground Integrated Wireless Edge Networks

Yu-Jia Chen, Ai-Chun Pang, National Taiwan University, Taiwan; Te-Chuan Chiu, Research Center for Information Technology Innovation, Academia Sinica, Taiwan

In this tutorial, we discuss how intelligent unmanned aerial vehicles (UAVs) play a key role in the next generation mobile wireless system with air-ground integrated networks. We first give an update of the 5G NR in 3GPP, including the ultra-reliable low latency communication (URLLC) and the enhancement for supporting aerial UE. Then, we introduce some basic network architectures, such as multi-access edge computing (MEC), software-defined networking (SDN), as defined by 3GPP or ETSI, and present the emerging air-ground integrated wireless networks. Specifically, we use an example to illustrate the low-latency scenario required by future AIoT (AI and IoT) services.

Yu-Jia Chen received the B.S. degree and Ph.D. degree in electrical engineering from National Chiao Tung University, Taiwan, in 2010 and 2013, respectively. From 2015 to 2018, he was a postdoctoral research fellow with National Chiao Tung University, Taiwan, and he was a postdoctoral research fellow with Harvard University from 2018 to 2019. In 2019, he joined National Central University, Taiwan, where he is currently an assistant professor at the department of communication engineering. His research interests include low-latency communications, wireless sensing, and network security. Dr. Chen has published more than 30 articles in peer-reviewed journal and conference papers. He is holding three US patents and three ROC patents.

Dr. Chen has been serving as Technical Organizing Committee and Symposium Cochair for many international conferences and symposiums, including Globecom, VTC, and PIMRC. He is also a member of the IEEE workshop SPSCS, focusing on security and privacy in smart and connected systems. Prof. Chen has experience with tutorials at academic conferences such as Globecom.

Ai-Chun Pang received the B.S., M.S. and Ph.D. degrees in Computer Science and Information Engineering from National Chiao Tung University, Taiwan, in 1996, 1998 and 2002, respectively. She joined the Department of Computer Science and Information Engineering, National Taiwan University (NTU), Taiwan, in 2002, and is now a Professor and Associate Dean of the College of Electrical Engineering and Computer Science, NTU. She was the director of Graduate Institute of Networking and Multimedia, NTU, 2016-2017. Her research interests include wireless and mobile communications, software-defined networking, and fog/edge computing for low-latency AI and IoT services.

Dr. Pang was the leading guest editor of IEEE Transactions on Vehicular Technology (TVT) special issue on “Fog/Edge Computing for Autonomous and Connected Cars”, and the guest editor of IEEE Wireless Communications Special issue on “Voice over WLAN”. She is currently the editor of IEEE Transactions on Mobile Computing, IEEE TVT, IEEE Transactions on Green Communications and Networking, and ACM Transactions on Cyber-Physical Systems. She has served on the technical program committees of prestigious conferences, including IEEE INFOCOM, IEEE GLOBECOM, IEEE ICC, and IEEE VTC. She is also a co-author of the book “Wireless and Mobile All-IP Networks” published by John Wiley, and is an IEEE VTS Distinguished Lecturer.

Te-Chuan Chiu received his B.S. degree in Computer Science from National Tsing Hua University, Taiwan, in 2010, M.S. and Ph.D. degrees in Computer Science and Information Engineering from National Taiwan University, Taiwan, in 2012, and 2018, respectively. He was a research scholar of the school of electrical, computer and energy engineering from Arizona State University, USA, in 2016-2017. He is currently a postdoctoral research fellow at the Research Center for Information Technology Innovation, Academia Sinica. His research interests include 5G communications, fog/edge computing, and energy harvesting technology. Dr. Chiu was awarded the 2018 Member of the Phi Tau Phi Scholastic Honor Society of the Republic of China.

T4: Low Resolution Signal Processing in Communications Using a Machine-Learning Framework

Jan Lewandowsky, Maximilian Stark, Hamburg University of Technology, Germany

The design of quantized algorithms for communication systems using mutual information as a design criterion has recently attracted considerable interest in the communications community. The fundamental idea is building quantized signal processing chains that aim to preserve the maximum possible relevant information in all involved signal processing algorithms, while using as few bits as possible for the signal representation and processing. This idea is different to conventional design approaches for quantized systems, which typically focus on minimizing a distortion measure for a given precision, for example, the mean squared error. A framework from machine-learning termed the Information Bottleneck method can be applied as a very powerful tool to design quantized signal processing algorithms with a focus on the preservation of relevant information. While this method is well known in the machine learning community, it is still rather unknown in the communications community. However, recent works describe very successful applications of the Information Bottleneck method in quantizer design, the design of low-density parity-check decoders for binary and nonbinary codes, the construction of polar decoders and detection schemes, as well as in resource allocation of wireless systems. Most importantly, the Information Bottleneck approach
allows obtaining coarsely quantized signal processing algorithms with very simple signal processing operations, but close-to-optimum performance. This tutorial covers the information theoretical ideas behind the Information Bottleneck method and explains how its information theoretical concept can be applied to build quantized signal processing algorithms for the aforementioned applications in detail. Moreover, it provides very intuitive and easy-to-understand examples that illustrate and visualize the presented information theoretical ideas in practice, to enable an easy understanding.

Jan Lewandowski is a scientific researcher with the software defined radio group of the Fraunhofer Institute for Communication, Information Processing and Ergonomics (FKIE) in Wachtberg, Germany. He is also a Ph. D. candidate with the Institute of Communications at the Hamburg University of Technology (TUHH) in Hamburg, Germany. He has submitted his Ph.D. dissertation on signal processing approaches for communications based on the Information Bottleneck method to the dissertation committee of the TUHH in December 2019 and aims to graduate in 2020. From 2006 until 2018 he was an active officer with the German Air Force with a focus on radio communications and radar data processing. Jan Lewandowski has received the B.Sc. degree and the M.Sc. degree (with distinction) in electrical engineering from the University of the Federal Armed Forces Munich in Neuherberg, Germany in 2010 and 2011, respectively. He received the first price award for his master thesis on robust communication in fast fading environments from the German chapter of Armed Forces Communications and Electronics Association in 12. His research interests are mainly channel coding and modulation as well as practical applications of information theory in communication systems. Jan Lewandowski lives in the Mid-Rhine region in Germany.

Maximilian Stark is a scientific researcher with the Institute of Communications at the Hamburg University of Technology (TUHH) in Hamburg, Germany. After having received the B.Sc. degree and the M.Sc. degree (with distinction) in electrical engineering from the TUHH in 2014 and 2017, respectively, he started to work on his Ph.D. on machine learning and signal processing with the Information Bottleneck method and related information theoretical concepts. In 2019, he joined the machine-learning group at the Nokia Bell Labs in Paris as a visiting researcher focusing on deep learning for communications. In the scope of his Ph.D. thesis, he also works in research cooperations with the Japan Advanced Institute of Science and Technology (JAIST), University of California (UCLA) and other cooperation partners. He has won the Karl H. Ditze award for his Master thesis in 2015. Channel coding and modulation also dominate his current research interests. Matters of particular interest in this context are machine-learning approaches for constellation design, detection and channel decoding as well as compressed sensing and massive-machine-type communication. Despite his young age, Maximilian Stark has authored and co-authored many papers in technical journals and conferences already. Maximilian Stark lives in Hamburg, Germany.

T5: Softwarization and Virtualization in the Networks of the Future

Fabrizio Granelli, University of Trento, Italy; Frank Fitzek, Technische Universität Dresden, Germany

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 (ComNetSEnu) 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 prepare 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.

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 Director 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, IEEE ComSoc Director for Online Content in 2016-17 and IEEE ComSoc Director for Education. Services for 2018-19. He is the coordinator of the research and didactical activities on computer networks within the degree in Telecommunications Engineering as leader of the Next Generation Networks Research Group. He is author or co-author of more than 250 papers published in international journals, books and conferences in networking, computer science, performance modeling, cross-layering, wireless networks, cognitive radio 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. In 2005 he won the TRP 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 SAPERE AUDE research grant from the Danish government and in 2012 he received the Vodafone Innovation price. 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.

T6: Millimeter-wave Beam Management for 5G-NR and Beyond

Danijela Cabric, Han Yan, UCLA, USA

Millimeter wave (mmWave) communications with massive antenna array is key technique for the future cellular systems. While large arrays enable high gain, directionality and user multiplexing, practical realizations face challenges in radio hardware design and cross layer processing. The tutorial starts with review of the emerging hybrid array architecture. The corresponding MIMO processing that heavily relies on analog beam steering is referred as beam management. The basic system model, approach, and performance of beam oriented MIMO is surveyed and compared with conventional MIMO that requires explicit channel estimation. Four procedures that are interleaved between physical layer and higher layer are the main components of such system, namely beam acquisition, tracking, association and handover. The second part of tutorial reviews the beam management in 5G NR, i.e., 3GPP release 15 and the upcoming release 16. We focus on changes in frame structure and procedure that facilitate beam management. The third part covers recent research for future mmWave cellular systems with emphasis in scalability with the increased array size, user number and cell density. We review signal processing techniques for beam management that exploits sparsity, approaches using low resolution fully digital array, and recent advances in Qo5 aware cell/beam association and handover.

Danijela Cabric is Professor in Electrical and Computer Engineering at University of California, Los Angeles. She earned the M.S degree in Electrical Engineering in 2001 from UCLA and the Ph.D. degree in Electrical Engineering in 2007 from UC Berkeley. Dr. Cabric received the Samueli Fellowship in 2008, the Okawa Foundation Research Grant in 2009, the Hellman Fellowship in 2012 and the National Science Foundation Faculty Early Career Development ( CAREER) Award in 2012. She is currently an Associate Editor of IEEE Transactions of Cognitive Communications and Networking and IEEE Transactions on Wireless Communications. Her research interests include novel radio architecture, signal processing, and networking techniques for cognitive radio, 5G and massive MIMO systems. She is Senior Member of IEEE and IEEE ComSoc Distinguished Lecturer.

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Han Yan is a senior Ph.D. candidate in Electrical and Computer Engineering at University of California, Los Angeles (UCLA). He received the B. Eng. degree from Zhejiang University, Hangzhou, P. R. China in 2013, and the M.S. degree in Electrical Engineering from UCLA in 2015. His research interests include signal processing for millimeter-wave communications, cognitive radio, and coordinated UAV wireless communications. Mr. Yan is the recipient of UCLA Dissertation Year Fellowship in 2018, and Qualcomm Innovation Fellowship Finalist in 2019.

T7: Efficient Global Optimization
Bho Matthiesen, University of Bremen, Germany; Eduard A. Jorswieck, Technische Universität Braunschweig, Institut für Nachrichtentechnik, Germany

Global optimization is concerned with obtaining the globally optimal solution of nonconvex optimization problems. Algorithms for such problems can mostly be categorized into outer approximation algorithms and branch and bound (BB) methods. This tutorial will focus on BB methods for continuous optimization and demonstrate that they are one of the most versatile tools in global optimization theory. We take a modular approach to the BB framework and cover the aspects of rectangular subdivision, selection, bounding, and feasibility testing, both, from a theoretical and practical perspective. The focus for the bounding part is on exploiting partial monotonicity in the problem, which leads to the novel mixed monotonic programming (MMP) framework, a generalization of classical monotonic optimization (MO). Common feasibility checks are discussed and we highlight some pitfalls that lead to slow convergence speeds. The successive incumbent transcending (SIT) scheme is introduced as a remedy and its integration with BB is discussed. A notable side effect of this SIT scheme is that it also improves numerical stability when dealing with complicated feasible sets.

The theory developed in the first part of this tutorial will be applied in several case studies from the area of resource allocation for wireless networks. In particular, we will cover energy-efficient resource allocation and show how to approach such problems without Dinkelbach’s algorithm. Further applications are hierarchical resource allocation, beamforming, and resource allocation over rate regions. Although all of these problems are NP-hard we will demonstrate that they can be solved efficiently for small to medium scale problems.

Bho Matthiesen received the Diplom-Ingenieur (M.Sc.) degree and his Ph.D. degree (with distinction) from Technische Universität Dresden, Germany, in 2012 and 2019, respectively. From 2012 to 2019, he has been with the Chair of Communications Systems at Technische Universität Dresden. Since 2020, he is a research group leader at the U Bremen Excellence Chair of Petar Popovski in the Department of Communications Engineering, University of Bremen, Germany. His research interests are in the area of signal processing for wireless communications, with a focus on optimization methods for resource allocation. He was an invited speaker at the 2nd 6G Wireless Summit and is a publication chair for the International Symposium on Wireless Communications Systems (ISWCS) 2020.

Eduard A. Jorswieck was born in 1975 in Berlin, Germany. Since August 2019, he has been the head of the Chair for Communications Systems and Full Professor at Technische Universität Braunschweig, Germany. From 2008 until 2019, he was the head of the Chair of Communications Theory and Full Professor at Dresden University of Technology (TUD), Germany. His main research interests are in the broad area of communications. He has published more than 110 journal papers, 13 book chapters, 3 monographs, and some 275 conference papers on these topics. Dr. Jorswieck is an IEEE Fellow and member of the IEEE SAM Technical Committee since 2015. Since 2017, he serves as Editor-in-Chief of the EURASIP Journal on Wireless Communications and Networking. He serves currently on the editorial board for IEEE Transactions on Information Forensics and Security. In 2006, he received the IEEE Signal Processing Society Best Paper Award.

T8: Coding for Edge Computing
Alexandre Graell i Amat, Chalmers University of Technology, Sweden; Eirik Rosnes, Simula UiB, Norway; Albin Severinson, Simula UiB and University of Bergen, Norway

Distributed computing systems have emerged as one of the most effective ways of solving increasingly complex computational problems in a wide range of domains, e.g., in large-scale machine learning and data analytics. For example, Google routinely performs computations over several thousands of servers. For applications such as the Internet of Things (IoT), intelligent transportation systems, and real-time online gaming, processing data in the cloud typically results in latencies that are not acceptable. In this context, edge computing has emerged as the new paradigm to reduce latency and save bandwidth. Edge computing has been recognized as a pillar of the 5G network architecture and an enabler of computation-intensive applications on IoT devices.

The promised benefits of edge computing, however, come with important challenges, among them the problems of straggling edge nodes and limited bandwidth, which may severely penalize the latency, and the unreliability of nodes and communication links, which not only impact the latency, but also impair the accuracy of the computation. Furthermore, performing computations over possibly untrustable edge nodes or on the user devices themselves, pose serious concerns about security and privacy.

This tutorial will show how channel coding is a powerful tool to overcome these challenges, bringing significant improvements in terms of latency and accuracy, as well as providing security and privacy. It assumes a basic understanding of linear algebra and probability theory.

Alexandre Graell i Amat is a Professor with the Department of Electrical Engineering, Chalmers University of Technology, Sweden, and an Adjunct Research Scientist with Simula UiB, Norway. His research interests are in the field of coding theory and its application to areas including distributed storage and computing, privacy, and optical communications. Prior to joining Chalmers, he was a Visiting Scholar with the University of California at San Diego, USA (2001-2002). In 2002-2003 he held a visiting appointment at Universitat Pompeu Fabra, Spain. In 2004 he held a part-time appointment at STMicroelectronics Data Storage Division, Italy. In 2004-2005 he was a Visiting Professor with Universitat Pompeu Fabra. From 2006 to 2010, he was with the Department of Electronics, IMT Atlantique (former ENST Bretagne), France. He joined Chalmers in 2011.

Eirik Rosnes is a Chief Research Scientist and Section Leader of the Information Theory Section at Simula UiB, Bergen, Norway. His research interests are in the areas of communication and information theory, including classical codes, codes on graphs, codes for distributed storage and coding for privacy. Prior to joining Simula UiB, he was with the Department of Informatics, University of Bergen from 2003 to 2011, first as a Postdoctoral Researcher, then as a Senior Researcher, and from 2020 as a Chief Research Scientist. From 2001 to 2002 and from 2005 to 2007, he was a Ph.D. fellow at the Center for Magnetic Recording Research, University of California at San Diego, La Jolla, CA, USA. From 2011 to 2013, he was a Senior Engineer with Ceronag Networks, and since 2013, he has been with both the University of Bergen (until 2017) as an Adjunct Associate Professor and with the Simula Research Laboratory / Simula UiB. Dr. Rosnes was a Technical Program Co-Chair for the 2009 International Workshop on Coding and Cryptography, Ullensvang, Norway, and is currently serving as Associate Editor for the AEU International Journal of Electronics and Communications and the IEEE Transactions on Information and Communication Technologies.

Albin Severinson is a PhD candidate with Simula UiB and the Department of Informatics at the University of Bergen (UiB), Bergen, Norway, under the supervision of Dr. Rosnes and Prof. Graell i Amat. Prior to joining Simula UiB and UiB, he studied at Chalmers University, Gothenburg, Sweden and TU Delft, The Netherlands. His research is on coding for distributed computing. Albin Severinson is the founder of Rendits, a company developing vehicle-to-vehicle communication equipment and is the president of UiBdoc, an organization working to further the interests of PhD candidates and PostDocs at UiB. He has participated in the Grand Cooperative Driving Challenge vehicle automation competition on the Chalmers team and in the World Solar Challenge on the TU Delft team.
**T9: Optical Wireless Communication: Fundamental Limits, New Advances and Future Perspectives**

Y Anas Chaaban, University of British Columbia, Canada; Zouheir Rezki, University of Idaho, USA; Mohamed-Slim Alouini, King Abdullah University of Science and Technology, Saudi Arabia

Driven by the crowded RF spectrum, Optical Wireless Communications (OWC) recently gained increasing industrial and academic interest. OWC can be used for various applications including but not limited to vehicle-to-vehicle communication and vehicle-to-infrastructure communication. However, OWC has fundamental differences compared with radio-frequency communications, which must be considered when designing an OWC communication system. Consequently, it is important to understand the fundamentals of, and design guidelines for OWC systems. This tutorial covers these aspects for Intensity-Modulation OWC for practical outdoor, indoor, and vehicular communications applications.

Anas Chaaban received his M.Sc. degree in Electronics from the Lebanese University, Lebanon, in 2006. He received his M.Sc. degree in Communications Technology and his Dr.-Ing. (Ph.D.) degree in Electrical Engineering and Information Technology from the University of Ulm and the Ruhr-University of Bochum, Germany, in 2009 and 2013, respectively. He joined the University of British Columbia, Okanagan Campus, as an Assistant Professor in 2018. His research interests are in the areas of information theory, coding, and their application in wireless communications.

Dr. Chaaban received the Canadian Society of Information Theory paper award in 2019, the best paper award at ICCSP4 in 2015, and the best poster award at the IEEE Comm. Theory Workshop in 2011. He is a member of the IEEE since 2009, a Senior Member since 2017, and a member of the Canadian Society of Information Theory. He served as an editor of the IEEE Access Special Section on Optical Wireless Technologies for 5G Communications and Beyond (2017), the Transactions on Emerging Telecommunications Technologies (Wiley) (2017-2018), and the EURASIP Journal on Wireless Communication Networks (Springer) (2017-2018). He currently serves as an editor of the IEEE Transactions on Communications, a financial chair of the IEEE Communication Theory Workshop (CTW) 2020, and a technical program committee member of multiple conferences.

Zouheir Rezki is an Assistant Professor in the Electrical and Computer Engineering Department at the University of Idaho. He is a 2019 (2020 – 2025) NSF CAREER Awardee. He received his Ph.D. from University of Montreal, Polytechnique Engineering School in 2008 and his thesis was nominated for “Best Thesis of the Year”. Before joining the University of Idaho in August 2016, he was a Senior Research Scientist in the Computer Electrical and Mathematical Sciences and Engineering Division at King Abdullah University of Science and Technology (KAUST). Before joining KAUST in 2009, he was a Postdoctoral Research Fellow at the University of British Columbia. During this time, he received the prestigious Postdoctoral Research Fellowship Grant: CA 30 K from “The Fonds Québécois de la recherche sur la nature et les technologies”, for research on Cognitive Radio Networks. In 2013, he has been elevated to the rank of Senior Member of IEEE. In 2014, he has been appointed Editor of IEEE Wireless Communications Letters. His current research covers a wide range of topics in wireless communications and networking including security and privacy of data networks, applying machine-learning techniques to design and optimize modern communication systems, information theory, millimeter wave (mmWave) communication, optical communication and application of communication as an enabling technology for smart grids.

Mohamed-Slim Alouini is an IEEE Fellow since 2009. He was born in Tunis, Tunisia. He received the Ph.D. degree in electrical engineering from the California Institute of Technology (Caltech), Pasadena, CA, USA, in 1998. He served as a Faculty Member in the University of Minnesota, Minneapolis, MN, USA, then in the Texas A&M University at Qatar, Education City, Doha, Qatar, before joining the King Abdullah University of Science and Technology (KAUST), Thuwal, Makkah, Saudi Arabia, as a Professor of electrical engineering in 2009. His current research interests include the modeling, design, and performance analysis of wireless communication systems.

**T10: Aerial Communications and Networks**

Kamesh Namuduri, University of North Texas, USA, with Keynote Presenters: Serge Chaumette, Université de Bordeaux, France; Ravikumar Pragada, InterDigital, Inc., USA; Helka-Liina Määttänen, Ericsson, Finland; Günkan Gór, Zurich University of Applied Sciences, Switzerland

As unmanned aircraft systems (UAS) are being integrated into the National Airspace (NAS) around the world, there is a need for enhanced situational awareness and traffic management of UASs, and safety and security of people and infrastructure. Standardization efforts are being pursued to support UAS Traffic Management (UTM), over-the-air communications between UASs, Beyond Radio Line-of-Sight (BRLOS) communications, and UAS navigation and command and control using satellite, cellular, and ad hoc networks. At present, National Aeronautics and Space Administration (NASA) is leading the standardization efforts for UTM and the Institute of Electrical and Electronics Engineers (IEEE) is leading the standardization efforts for Self-organized Aerial Communications and Networking of UASs through the IEEE P1920.1 Working Group.

This tutorial is intended to provide an overview of the state of art in aerial communications and networking. It covers topics such as vehicle-to-vehicle communications and ad hoc networking, along with experiences gained from flight-tests, experimental test-beds and simulations. While the focus is primarily on standardization, novel ideas towards future research such as swarm autonomy, and mesh networking for UASs will also be discussed.

Kamesh Namuduri is a Professor of Electrical Engineering and the director of Autonomous Systems Laboratory at the University of North Texas (UNT). He received his B.S. degree in Electronics and Communication Engineering from Osmania University, India, in 1984, M.S. degree in Computer Science from University of Hyderabad in 1986, and Ph.D. degree in Computer Science and Engineering from University of South Florida in 1992. Over the past eleven years, his research is focused on aerial networking and communications. He co-organized a series of workshops on “Airborne Networking and Communications” in conjunction with IEEE, AIAA, AUVSI, and ACM Conferences. He is serving as the chair for two Standards Working Groups (IEEE 1920.1: Aerial Communications and Networking and IEEE P1920.2: Vehicle-to-Vehicle Communications for Unmanned Aircraft Systems). He is serving as the Chair for the IEEE Vehicular Technology Society’s Ad Hoc Committee on Drones. He is a co-editor for the book titled “UAV Networks and Communications” published by the Cambridge University Press in 2017. He is leading the Smart and Connected Community project on “Deployable Communication Systems” in collaboration with the government, public, and private organizations. This living laboratory project was demonstrated thrice during the Global City Teams Challenge hosted jointly by the National Institute of Standards and Technology and US Ignite in 2015, 2016, 2017, and 2018. He contributed to the development of research agenda, requirements and blueprints highly-deployable communications systems led by the National Institute of Standards and Technology and National Public Safety Telecommunications Council.
Keynote Program

**Wednesday, 18 November 2020, 9 – 10am EST**

**Keynote: The Research Directions for 6G**
Wen Tong, Huawei Wireless

**Thursday, 19 November 2020, 11 – 12pm EST**

**Keynote: Deep Analog-to-Digital Compression with Applications to Automotive Radar and Massive MIMO**
Yonina Eldar, Weizmann Institute of Science

**Friday, 20 November 2020, 9 – 10am EST**

**Keynote: Millimeter-Wave and THz Channels and Systems for High-Mobility Environments**
Andreas Molisch, University of Southern California

**Saturday, 21 November 2020, 9 – 10am EST**

**Keynote: What Should 6G Be?**
Mohamed-Slim Alouini, KAUST

Technical Sessions

**Thursday, 19 November 2020**

- **IoV, IoT, M2M, Sensor Networks, and Ad-Hoc Networking I**
- **Machine Learning and AI for Communications I**
- **Multiple Antennas and Cooperative Communications I**
- **Signal Transmission and Reception I**
- **Spectrum Management, Radio Access Technology, Heterogeneous Networks I**
- **Vehicle Cooperation and Control, Assisted and Autonomous Driving I**
- **Wireless Networks: Protocols and Security I**
- **Recent Results I**

**Friday, 20 November 2020**

- **IoV, IoT, M2M, Sensor Networks, and Ad-Hoc Networking II**
- **Machine Learning and AI for Communications II**
- **Multiple Antennas and Cooperative Communications II**
- **Signal Transmission and Reception II**
- **Spectrum Management, Radio Access Technology, Heterogeneous Networks II**
- **Vehicle Cooperation and Control, Assisted and Autonomous Driving II**
- **Wireless Networks: Protocols and Security II**
- **Recent Results II**
Saturday, 21 November 2020

AIRBORNE AND MARITIME MOBILE SYSTEMS AND SERVICES
ANTENNA SYSTEMS, PROPAGATION, AND RF DESIGN
ELECTRIC VEHICLES, VEHICULAR ELECTRONICS, AND INTELLIGENT TRANSPORTATION
FUTURE TRENDS AND EMERGING TECHNOLOGIES
IoV, IoT, M2M, SENSOR NETWORKS, AND AD-HOC NETWORKING III
POSITIONING, NAVIGATION AND SENSING
RECENT RESULTS III
RECENT RESULTS IV

Patrons and Exhibitors

IEEE VTS would like to thank the Huawei for their contributions to the success of the conference.
Keynotes

Wednesday 18 November 2020 14:00 UTC
The Research Directions for 6G
Wen Tong, CTO, Wireless Network, Huawei Wireless

In this talk, we present our view on 6G technologies, its trends and research directions. Wireless technology have gone through several major revolutions and it is always the case that the disruptive technologies enable the wireless innovation and market success.

As 5G technology enables the digital transformation of every vertical business, we see a radical paradigm shift from the conventional operator-centric view to an inclusive prosumer-centric view, and the new approach to a federated networking and service provisioning, redefining the smart connectivity infrastructure as a much more dynamic composition of all resources of participating users. This include the spectrum usage reform and infrastructure sharing, we present four fundamental changes in terms of 6G networking and associated research challenges.

The other aspect for 6G is a total unification of mobile, satellite, network, cloud, cloud-edge computing, ML, AI, end-to-end cybersecurity, innovative devices, Industry IoT, cell-less MIMO and Terahertz Communication to support the prosumer-centric model, in this architecture, we list a few technology enablers, such as mmWave-THz sensing, machine learning-training DNN to enable semantic communications as intelligent connectivity, the research in these areas will shape the radio access for 6G.

Since the 6G is future platform to enable new innovations with its state-of-the-art capabilities, we provide an analysis of the key-performance indicators for 6G. In addition, we share our view of the potential impact of Quantum computing, mega-satellite-constellation and neural-center (instead of data center) to 6G.

Dr. Wen Tong is the CTO, Huawei Wireless. He is the head of Huawei wireless research. In 2011, Dr. Tong was appointed the Head of Communications Technologies Labs of Huawei, currently, he is the Huawei 5G chief scientist and leads Huawei’s 10-year-long 5G wireless technologies research and development.

Prior to joining Huawei in 2009, Dr. Tong was the Nortel Fellow and head of the Network Technology Labs at Nortel. He joined the Wireless Technology Labs at Bell Northern Research in 1995 in Canada.

Dr. Tong is the industry recognized leader in invention and standardization of advanced wireless technologies, he is the key contributor to 3GPP since its inception. Dr. Tong was elected as a Huawei Fellow and an IEEE Fellow. He was the recipient of IEEE Communications Society Industry Innovation Award for “the leadership and contributions in development of 3G and 4G wireless systems” in 2014, and IEEE Communications Society Distinguished Industry Leader Award for “pioneering technical contributions and leadership in the mobile communications industry and innovation in 5G mobile communications technology” in 2018. He is also the recipient of R.A. Fessenden Medal. For the past three decades, he had pioneered fundamental technologies from 1G to 5G wireless and Wi-Fi with more than 450 granted US patents.

Dr. Tong is a Fellow of Canadian Academy of Engineering, and he serves as Board of Director of Wi-Fi Alliance.

Thursday 19 November 2020 14:00 UTC
Deep Analog-to-Digital Compression with Applications to Automotive Radar and Massive MIMO
Yonina Eldar, Professor, Weizmann Institute of Science

The famous Shannon-Nyquist theorem has become a landmark in analog to digital conversion and the development of digital signal processing algorithms. However, in many modern applications, the signal bandwidths have increased tremendously, while the acquisition capabilities have not scaled sufficiently fast. Furthermore, the resulting high rate digital data requires storage, communication and processing at very high rates which is computationally expensive and requires large amounts of power.

In this talk we consider a general framework for sub-Nyquist sampling and processing in space, time and frequency which allows to dramatically reduce the number of antennas, sampling rates, number of bits and band occupancy in a variety of applications. It also allows for the development of efficient joint radar-communication systems. Our framework relies on exploiting signal structure, quantization and the processing task in both standard processing and in deep learning networks. We consider applications of these ideas to a variety of problems in wireless communications, efficient massive MIMO systems, automotive radar and ultrasound imaging and show several demos of real-time sub-Nyquist prototypes including a wireless ultrasound probe, sub-Nyquist automotive radar, cognitive radio and radar, dual radar-communication systems, analog precoding, sparse antenna arrays, and a deep Viterbi decoder.

Yonina Eldar is a Professor in the Department of Mathematics and Computer Science, Weizmann Institute of Science, Rehovot, Israel. She was previously a Professor in the Department of Electrical Engineering at the Technion, where she held the Edwards Chair in Engineering. She is also a Visiting Professor at MIT, a Visiting Scientist at the Broad Institute, and an Adjunct Professor at Duke University and was a Visiting Professor at Stanford. She received the B.Sc. degree in physics and the B.Sc. degree in electrical engineering both from Tel-Aviv University (TAU), Tel-Aviv, Israel, in 1995 and 1996, respectively, and the Ph.D. degree in electrical engineering and computer science from the Massachusetts Institute of Technology (MIT), Cambridge, in 2002. She is a member of the Israel Academy of Sciences and Humanities, an IEEE Fellow and a EURASIP Fellow. She has received many awards for excellence in research and teaching, including the IEEE Signal Processing Society Technical Achievement Award (2013), the IEEE/AESS Fred Nathanson Memorial Radar Award (2014) and the IEEE Kiyo Tomiyasu Award (2016). She was a Horev Fellow of the Leaders in Science and Technology program at the Technion and an Alon
Fellow. She received the Michael Bruno Memorial Award from the Rothschild Foundation, the Weizmann Prize for Exact Sciences, the Wolf Foundation Krill Prize for Excellence in Scientific Research, the Henry Taub Prize for Excellence in Research (twice), the Hershel Rich Innovation Award (three times), the Award for Women with Distinguished Contributions, the Andre and Bella Meyer Lectureship, the Career Development Chair at the Technion, the Muriel & David Jacknow Award for Excellence in Teaching, and the Technion’s Award for Excellence in Teaching (two times). She received several best paper awards and best demo awards together with her research students and colleagues, was selected as one of the 50 most influential women in Israel, and was a member of the Israel Committee for Higher Education. She is the Editor in Chief of Foundations and Trends in Signal Processing and a member of several IEEE Technical Committees and Award Committees.

Friday 20 November 2020 14:00 UTC

Millimeter-wave and THz Channels and Systems for High-mobility Environments

Andreas F. Molisch, Professor, University of Southern California

Millimeter-wave based communications is one of the key components of 5G. Among other applications, high-rate communications for both passengers and control systems in vehicular and train environments are envisioned. This talk will start out by discussion propagation channels in high-mobility environments, describing both recent measurements and suitable models. This will be followed by a discussion of antenna and MIMO technology for such systems, their complexity, and sensitivity to mobility.

Andreas F. Molisch received his PhD and habilitation from TU Vienna. After 10 years in industry he joined the University of Southern California, where he is now the Solomon Golomb – Andrew and Erna Viterbi Chair Professor. His research interest is wireless communications, with emphasis on wireless propagation channels, multi-antenna systems, ultrawideband signaling and localization, novel modulation methods, caching for wireless content distribution, and edge computing. He is the author of four books, 21 book chapters, more than 250 journal papers, 350 conference papers, as well as 80 patents. He is a Fellow of the National Academy of Inventors, IEEE, AAAS, and IET, as well as Member of the Austrian Academy of Sciences and recipient of numerous awards.

Saturday 21 November 2020 14:00 UTC

What Should 6G Be?

Mohamed-Slim Alouini, Professor, King Abdullah University of Science and Technology

The role of Internet and Communication Technology (ICT) in bringing about a revolution in almost all aspects of human life needs no introduction. It is indeed a well-known fact that the transmission of the information at a rapid pace has transformed all spheres of human life such as economy, education, and health to name a few. In this context, and as the standardization of the fifth generation (5G) of wireless communication systems (WCSs) has been completed, and 5G networks are in their early stage of deployment, the research visioning and planning of the sixth generation (6G) of WCSs are being initiated. 6G is expected to be the next focus in wireless communication and networking and aim to provide new superior communication services to meet the future hyper-connectivity demands in the 2030s. In addition, keeping in mind that urbanized populations have been the major beneficiary of the advances offered by the previous generations of WCSs and motivated by the recently adopted united nations sustainability development goals intended to be achieved by the year 2030, 6G networks are anticipated to democratize the benefits of ICT. Indeed these advantages are still not experienced by almost 4 billion people in the world who are still “unconnected or under-connected” and who suffer as such from the “digital divide”, a term coined in order to emphasize the lack of ICT infrastructure in many parts of the world. Given this background, this talk aims to (i) provide an envisioned picture of 6G, (ii) serve as a research guideline in the beyond 5G era, and (iii) go over the recently proposed solutions to provide high-speed connectivity in under-covered areas in order to serve and contribute to the development of far-flung regions.

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

Panel

Standardization for Connected and Automated Vehicles

Organiser: Alvin Chin, BMW Technology Corporation, USA
Panelists: Alex Wyglinski, Worcester Polytechnic Institute and Past President of IEEE VTS Ricardo de Castro, German Aerospace Center (DLR) and Chair of VTS AVSC Jack Weast, Intel and Chair of IEEE P2846 Working Group Kirsten Matheus, BMW

There is much research and development for Connected and Automated Vehicles (CAVs) by vehicle manufacturers, OEMs, and internet companies. However, there is a lack of technology standards on how to develop, test and validate CAVs, how to ensure interoperability and how to guarantee safety and reliability. As a result, the IEEE VTS/Automated Vehicles Standards Committee (VTS/AVSC) was formed in November 2019 to address this. In this panel, speakers...
from standards developing organizations, industry, research centers and academia will provide an overview of some ongoing standardization efforts of CAVs, and what the IEEE VTS/AVSC is doing.

Each panelist has 15 minutes to present their talk, followed by 20 min Q&A. All talks will be pre-recorded and played during the panel to attendees. Q&A will be managed by chat, but the Moderator will ask each panelist a question of which the panelist can pre-record his/her answer. All questions on the Q&A chat will be sent and seen by the panelists, and they can answer at their convenience which will be shown in the chat.

Dr. Alvin Chin is AI and Emerging Technology Researcher at BMW Technology Corporation in Mountain View, USA where his research involves exploring AI and emerging technologies for potential use cases in production at BMW. Previously, he was Senior Machine Learning Researcher at BMW Technology Corporation in Chicago where he worked on big data and machine learning for improving driving behaviour and enabling intelligent driving, studying user behavior in driving and in social networks, mining big data from the car data, and creating recommendations of items based on user profiling and context such as predicted destinations and trips, to provide intelligent user and car experiences. Prior to BMW, he was Senior Researcher at Microsoft and Nokia in Beijing working on big data and analytics for browsing behavior in Xpress Browser, and Senior Researcher at Nokia Research Center working on mobile social networking in particular proximity social networks for inferring social activity, collaboration and recommendation in real physical environments. Dr. Chin has authored more than 30 publications and 10 patents including those pending. He has a Bachelors and Masters degrees in Computer Engineering from the University of Waterloo and a PhD in Computer Science from the University of Toronto. Dr. Chin is a member of various program committees such as ACM KDD, ACM Hypertext, IEEE CPSCom, ACM Ubicomp, ACM CSCW, and IEEE VTC. He is an ACM Senior Member and IEEE Senior Member. Dr. Chin is also active in the Chicago community, as Chair of ACM Chicago, Chair of the IEEE VTS Chicago Chapter, and Chair of the IEEE Computer Society Chicago Chapter. He is the Publicity Co-Chair for IEEE Vehicular Technology Conference-Fall 2020 and Secretary of the IEEE VTS/Automated Vehicles Standards Committee. Alvin can be reached at alvin.chin@ieee.org and his website is http://www.alvinychin.com.

Connected and Automated Vehicles from an Academic Perspective

Alex Wyglinski, Worcester Polytechnic Institute, Past President of IEEE VTS

Dr. Alexander M. Wyglinski is an internationally recognized expert in wireless communications, cognitive radio, 5G, connected vehicles, software-defined radio, dynamic spectrum access, satellite communications, vehicular technology, wireless system optimization and adaptation, autonomous vehicles, and cyber-physical systems. Dr. Wyglinski is a Full Professor of Electrical and Computer Engineering and a Full Professor of Robotics Engineering (courtesy appointment) at Worcester Polytechnic Institute, Worcester, MA, USA, as well as the Director of the Wireless Innovation Laboratory (WILab). Dr. Wyglinski is very active in the technical community, serving on the organizing committees of numerous technical conferences and several journal editorial boards. These activities include serving as the General Co-Chair for the 82nd IEEE Vehicular Technology Conference in Fall 2015, as well as Technical Editor of the IEEE Communications Magazine. From January 2018 to December 2019, Dr. Wyglinski served as the President of the IEEE Vehicular Technology Society, an applications-oriented society of approximately 5000 members that focuses on the theoretical, experimental, and operational aspects of electrical and electronics engineering in mobile radio, motor vehicles, and land transportation. Throughout his academic career, Dr. Wyglinski has published approximately 45 journal papers, over 120 conference papers, nine book chapters, and three textbooks. He is currently being or has been sponsored by organizations such as The MathWorks, Toyota InfoTechnology Center U.S.A., Defense Advanced Research Projects Agency, Naval Research Laboratory, MITRE Corporation, MIT Lincoln Laboratory, Office of Naval Research, Air Force Research Laboratory Space Vehicles Directorate, and the National Science Foundation. Dr. Wyglinski is a Senior Member of the IEEE, as well as a member of Sigma Xi, Eta Kappa Nu, and the ASEE.

Overview and Recent Activities of the IEEE VTS/Automated Vehicles Standards Committee

Ricardo de Castro, German Aerospace Center (DLR) and Chair of VTS AVSC

Automated Vehicles (AVs) pose great opportunities to improve safety, efficiency and energy consumption of transportation systems. However, this technology is still in its infancy. There is a lack of standardized best practices on how to develop, test and validate AVs, how to ensure interoperability and how to guarantee safety and reliability. To address these gaps, the IEEE VTS Automated Vehicles Standards Committee was created at the end of 2019. In this talk, we will provide an overview of the activities and standardization efforts of this new committee.

Dr Ricardo de Castro received the Licenciatura and Ph.D. degrees in electrical and computer engineering from University of Porto, Faculty of Engineering, Portugal, in 2006 and 2013, respectively. During 2007-2008 he was an entrepreneur with the WeMoveU project, targeting the development of powertrain control solutions for lightweight electric vehicles. Since 2013, he has been with the German Aerospace Center (DLR), Institute of System Dynamics and Control (SR), where he is developing enabling technologies for electric mobility and automated driving. He has been an expert evaluator for the European Union, editor of IEEE Transactions on Vehicular Technology, associate editor of IEEE Access, guest editor of IEEE Vehicular Technology Magazine and co-chair of the Technical Program Committee of the IEEE Vehicle Power and Propulsion Conference 2020. He is currently serving as chair of the IEEE VTS Automated Vehicles Standards Committee. Ricardo de Castro is also a Senior Member of the IEEE and the author of three patents and 60 papers in international journals, conferences and book chapters.

State of the State of AV Assurance

Jack Weast, Intel and Chair of IEEE P2846 Working Group

In this talk, Jack will provide a ‘State of the State’ regarding the development of a safety assurance framework for Automated Vehicles and a call to action for industry, researchers, and governments on what must be done to enable commercial deployment of AV’s.

Jack Weast is a Senior Principal Engineer at Intel and Vice President for Automated Vehicle Standards at Mobileye. In this role, Jack leads a global team working on AV safety technology and the related standards that will be needed to understand what it means for an AV to drive safely.

In his over 20-year career at Intel, Jack has built a reputation as a change agent in new industries with significant technical contributions to a wide range of industry-first products and standards in industries that are embracing complex high performance heterogeneous computing for the first time. With
an End to End Systems perspective, Jack combines a unique blend of embedded product experience with a knack for elegant System and Software design that will accelerate the adoption of Autonomous Driving.

Jack is the co-author of “UPnP: Design By Example”, and is the holder of over 40 issued patents with dozens pending. Jack is an Adjunct Professor at Portland State University where he was recently inducted into the Portland State Maseeh College Academy of Distinguished Alumni in recognition of Jack’s achievements, leadership, and service to the Engineering and Computer Science Profession, as well as to Society. Outside of work he is a classical pianist and never turns down an opportunity to take the karaoke stage.

Automotive Ethernet 2020
Kirsten Matheus, BMW

The automotive industry is one of the last to embrace Ethernet communication. 2008/2013 the industry saw the first introduction of 100BASE-TX/T1, with the roll out into most car manufacturers being completed just now. A huge eco-system has evolved around Ethernet, as well in physical layer variants as in supporting aspects like tools. However, the true changes that Ethernet communication allows for, like changing the way we develop cars by providing the right enabling infrastructure for a software defined car, yet needs to be fully understood before it can be properly exploited.

Dr Kirsten Matheus is engineer and economist. For the last 16 years, she worked in the automotive industry; 10 of which at BMW. At BMW, she is responsible for the in-vehicle networking strategy. This entails ensuring the availability of suitable in-vehicle networking technologies ahead of time. In this context she successfully introduced Ethernet as a networking technology into the automotive industry. In her opinion, only open standards provide the basis for long term sustainability of networking technologies. She and her former colleague Thomas Königseder describe their experiences, background and technical concepts behind the use of Ethernet in the automotive industry in a book titled “Automotive Ethernet”.

VTC2020-Fall Program
Thursday, 19 November 2020

IoV, IoT, M2M, Sensor Networks, and Ad-Hoc Networking I
1 A Modified Multi-Agent Reinforcement Learning Protocol Based on Prediction for UANETs
Chao Li, Shanghai Jiao Tong University

2 A Multi-Edge-Agent System approach for sharing heterogeneous computing resources
Florent Carlier, CREN, Le Mans University; Virgine Fresse, Laboratory Hubert Curien UMR CNRS 5516 and University of Jean Monnet; Jean-Paul Jamont, Laboratory LCIS, Grenoble INP and University of Grenoble Alpes; Arnaud Rosay, STMicroelectronics; Loïc Pallardy, ST Microelectronics

3 A Multi-Timescale Load Balancing Approach in Vehicular Edge Computing
Tao Lin, Quan Yuan, Beijing University of Posts & Telecommunications; Jinglin Li, Beijing University of Posts and Telecommunications; Shi Yang, Datang Xintong Co., Ltd.

4 A Scalable High-interaction Physical Honeypot Framework for Programmable Logic Controller
Jianzhuo You, Shichao Lv, University of Chinese Academy of Sciences; Lian Zhao, Ryerson University, Canada; Mengyao Niu, Zhijiang Shi, Limin Sun, University of Chinese Academy of Sciences

5 A Spatiotemporal Framework for Information Freshness in IoT Uplink Networks
Mustafa Emara, Intel Deutschland GmbH; Hesham ElSawy, KAUST; Gerhard Bauch, Hamburg University of Technology

6 Achieving Cooperative Diversity in Over-the-Air Computation via Relay Selection
Ruichen Jiang, Sheng Zhou, Tsinghua University; Kaibin Huang, The University of Hong Kong

7 Age-oriented Transmission for Multi-source Status Updates: a Waiting-and-Batching Scheme
Libo Yang, Harbin Institute of Technology (Shenzhen); Shaohua Wu, Harbin Institute of Technology; Ying Wang, Harbin Institute of Technology (Shenzhen); Weiqiang Wu, Shenzhen Polytechnic; Zhang Qinyu, Harbin Institute of Tech.

8 An Adaptive Superframe Change in a Wireless Vital Sensor Network for a Group of Outdoor Exercisers
Shinohke Hara, Osaka City University; takuma hamagami, Yasutaka Kawamoto, Oki Electric Industry Co., Ltd.; Hiroyuki Yomo, kansai University; Rysuke Miyamoto, Meiji University; Hiroyuki Okuhata, Soliton Systems K.K.

9 An Intelligent Routing Algorithm Based on Prioritized Replay Double DQN for MANET
Jue Cai, Chan Wang, Ming Lei, Minjian Zhao, Zhejiang University

10 Analysis of Outage Probability and Duration in Millimeter Wave Vehicle-to-Infrastructure Networks
Caglar Tunc, Shindum Panwar, New York University

11 Bid-Aware Privacy-Preserving Participant Recruitment in Mobile Crowd-Sensing
Sabrine Aroua, Rim Ben Messaoud, Yacine Ghamri-Doudane, University of La Rochelle

12 Blockchain-Enabled Targeted Information Dissemination Framework in Vehicular Networks
Pincan Zhao, Changle Li, Yuchuan Fu, Fan Li, Xidian University

13 Communications-Caching-Computing Tradeoff Analysis for Bidirectional Data Computation in Mobile Edge Networks
Luyitanyang Zhang, University of Washington; Yaping Sun, Shanghai Jiao Tong University

14 Computation Offloading Game for Edge Computing with Strategic Local Pre-Processing Time-Length
Changyan Yi, Nanjing University of Aeronautics and Astronautics; Jun Cai, Concordia University; WANG Ran, Kun Zhu, Nanjing University of Aeronautics and Astronautics

Machine Learning and AI for Communications I
1 A DQN-Based Handover Management for SDN-Enabled Ultra-Dense Networks
Mengting Wu, Wei Huang, Kai Sun, Inner Mongolia University; Haijun Zhang, University of Science and Technology Beijing

2 A Novel Complex PCA-based Wireless MIMO Channel Modeling Methodology
Zhiqiang Yuan, Zhang Jianhua, Yuxiang Zhang, Pan Tang, Tian Lei, Beijing University of Posts and Telecommunication

3 Adversarial Reinforcement Learning-based Robust Access Point Coordination Against Uncoordinated Interference
Yuto Khira, Yusuke Koda, Koji Yamamoto, Takayuki Nishio, Masahiro Morikura, Kyoto University
5 Automatic Modulation Recognition Method for Multiple Antenna System Based on Convolutional Neural Network
Jian Wu, Yu Wang, Wenhui Li, Guan Gui, Nanjing University; Ming Lei, Minjian Zhao, Zhejiang University; Fumiaki Adachi, Tohoku University

6 Autonomous Rate Control for Mobile Internet of Things: A Deep Reinforcement Learning Approach
Wenchao X, University of Waterloo; Haibo Zhou, Nanjing University; Nan Cheng, Xidian University; Meng Qin, Peng Cheng Laboratory; Song Guo, Hong Kong Polytechnic University

7 Beam Alignment for Millimeter Wave High Speed Train Communication Systems: A Bayesian Bandit Learning Approach
Jeonghun Park, Kyungpook National University; Seungkwon Baek, ETRI

8 Deep Learning Aided Power Allocation in An Energy Harvesting Untrusted Relay Network
Game optimization, Nanjing University of Aeronautics and Astronautics

9 Deep Reinforcement Learning-based Beam Tracking from mmWave Antennas Installed on Overhead Messenger Wires
Masao Shizuki, Yusuke Koda, Koji Yamamoto, Takayuki Nishio, Masahiro Morikura, Kyoto University; Chuan-hsiang Huang, Yushi Shirato, Naoki Kita, NTT Access Network Service Systems Laboratories

10 Deep Reinforcement Learning-Based User Pairing in Full-Duplex Communication Systems
Congliang Zhu, Jin Qu, Zhiqun Zou, Jianqiao Yuan, Guanding Yu, Zhejiang University

11 Dynamic Hidden Markov Model for Metropolitan Traffic Flow Prediction
Li zihan, Cainian Chen, Yang Min, Jianping He, Bo Yang, Shanghai Jiao Tong University

12 Enhancing WiFi Multiple Access Performance with Federated Deep Reinforcement Learning
Liuyiting Zhang, Hao Yin, University of Washington; Zhanke Zhou, Huazhong University of Science and Technology; Sumit, Roy, University of Washington; Yaping Sun, Shanghai Jiao Tong University

Multiple Antennas and Cooperative Communications

1 Achievable Rate Analysis of Hybrid Massive MIMO Uplink with Imperfect Phase Shifters
Linghui Ge, Southeast University; Hua Zhang, National Mobile Communications Research Lab., Wei Xu, Xiaohui You, Southeast University

2 Adaptive Grouped Physical Layer Multicast and Beamforming for Massive MIMO
Guosen Yue, Xiao-Feng Qi, Futurewei Technologies Inc

3 Adaptive Successive Interference Cancellation in Cell-free Massive MIMO-NOMA
Kai The Nguyen, Ha H. Nguyen, University of Saskatchewan; H. D. Tuan, University of Technology, Sydney

4 Application Level Performance of Carrier Aggregation in a Live LTE Network
Mark Akselrod, Leibniz Universität Hannover

5 Collaborative Vs. Non-Collaborative CFO Estimation for Distributed Large-Scale MIMO Systems
Sumin Jeong, University College Dublin; Arman Farhang, Maynooth University; Mark Flan, University College Dublin

6 Constrained-SVD based Hybrid Beamforming Design for Millimeter Wave Communications
Guilherme Zilli, Wei-Ping Zhu, Concordia University

7 Dynamic RRH Clustering using Affinity Propagation Algorithm in Ultra-Dense C-RAN
Seuj Park, Yonsei University; Han-Shin Jo, Hanbat National University; Cheol Mun, National University of Transportation; Jong-Gwan Youk, Yonsei University

8 Energy-Efficient Cell-Free Systems Using Finite Rate Feedback
Seungyung Kim, Byonhyo Shim, Seoul National University

9 Energy-efficient Two-Way Full-duplex UAVRelaying Networks With Imperfect Channel StateInformation
Game optimization, Nanjing University of Aeronautics and Astronautics

10 Hybrid Beamforming Design for C-RAN Based mmWave Cell-Free Systems
Zhihan Wang, Rang Liu, Hongyu Li, Ming Lan, Qian Liu, Dalian University of Technology

11 Investigation and Comparison of QuaDRiGa, NYUSIM and MG5G Channel Models for 5G Wireless Communications
Yaping He, Yang Zhang, Jin Zhang, Xidian University; Lihu Wang, Xu University of Science and Technology; Guangliang Ren, Xidian University

12 Joint Beamformer and Beamformee Design for Channel Smoothing in WLAN Systems
Eunsung Jeon, Samsung Electronics

13 Joint Time and Power Allocation for Cooperative NOMA based MEC System
Yujie Wen, Xiaotian Zhou, Shandong University; Fang Fang, University of Manchester; Haixia Zhang, Dongfeng Yuan, Shandong University

14 Joint Transceiver Design for Full-Duplex Amplify-and-Forward Cooperative Systems with Frequency-Selective Fading Channels
Fan-Shuo Tseng, National Sun Yat-sen University, Taiwan; Chun-Tao Lin, National Taipei University of Technology; Jian-Yi Chen, Meng-Jie Wang, National Sun Yat-sen University

Signal Transmission and Reception

1 A Damped GAMP Detection Algorithm for OFTS System based on Deep Learning
Xiaohe Xu, Ming-Min Zhao, Ming Lei, Minjian Zhao, Zhejiang University

2 A New Approach for Enhanced Detection Using Chirp Reference Signals
Ana Belen Martinez, Atul Kumar, Technische Universität Dresden; Marwa Chaft, ETIS, UMR 8051, CY Cergy Paris Université, ENSEA, CNRS; Gerhard Fettweis, Technische Universität Dresden

3 A Time-domain Phase Noise Mitigation Algorithm for OFDM Systems in the Wireless Backhaul Links
Peyman Neshaatsegaran, Huawei Technologies

4 Adaptive Transmission Based on MMSE Equalization over Fast Fading Channels
Hongyang Zhang, Xiaojing Huang, University of Technology Sydney; Andrew Zhang, UTS; Y. Jay Guo, University of Technology Sydney

5 Analysis of Non-binary Polar Codes over GF(3) and GF(5) with Phase Shift Keying for Short Messages
Melanie Fark, Gerhard Bauch, Hamburg University of Technology; Ivor Nissen, WTD 71

6 Analysis of Optimal Quasi-Orthogonal FH System with Array Receiver for Anti-Interference
Qi Zeng, Jun Zhong, Xing Liu, Sichuan University
7 Analysis of the Impact of Antenna Arrangement on System Capacity of MU-MIMO in the Presence of Terminal Mobility
Hirofumi Suganuma, Yukiko Shimbo, Waseda University; Hiromichi Tombe, Takashi Onodera, Sharp Corporation; Fumiaki Maehara, Waseda University

8 Asymptotic Cumulative Distribution Functions for Correlated Lognormal Channels and Their Applications in Selection Combining
Bingcheng Zhu, Southeast University; Julian Cheng, University of British Columbia; Zaichen Zhang, Liang Wu, Jian Dang, Southeast University

9 Constellation Design with Equal-probability Partition of a Copped Gaussian Distribution
Brett Wiens, Daniel Lee, Simon Fraser University

10 Cyclic Prefix Direct Sequence Spread Spectrum Capacity Analysis
Brent A. Kenney, Stephen N. Jenkins, University of Utah; Arslan J. Majid, Hussein Moradi, Idaho National Laboratory; Behrouz Farhang-Boroujeny, University of Utah

11 Downlink-Sum-Power Statistical Minimization for Massive MIMO Enabled SWIPT Systems over Rician Fading Channel
Mingjie Chi, Yang Zhang, Peili Hao, Xidian University; Lihua Pang, Xi'an University of Science and Technology; Guangliang Ren, Xidian University

12 Dynamic Resource Management to Enhance Video Streaming Experience in a C-V2X Network
Farhan Pervez, Ryerson University; Lian Zhao, Ryerson University, Canada

13 Effects of Eigenvector Distribution on Precoded Faster-than-Nyquist Signaling with Power Allocation
Keita Masaki, Takumi Ishihara, Shinya Sugihara, The University of Tokyo

14 Enhanced Alignment Signal for CP-Free OFDM: Concept and Performance
Bo Sun, Toni Levanen, Bo Tan, Markku Renfors, Mikko Valkama, Tampere University

15 Exact and asymptotic Performance Analysis of WPC links with channel estimation errors
Danyang Wang, Chinthu Tellambura, University of Alberta

16 Fast Power Reconstruction for User Detection of Autonomous Grant-free Data-only Schemes
Yihua Ma, Zhifeng Yuan, Yuzhou HU, Weimin Li, Li Zhigang, ZTE Corporation

17 Finite Length Non-binary Raptor Codes under Ordered Statistics Decoder
Fei Wang, Jian Jiao, Lianqin Li, Ke Zhang, Harbin Institute of Technology (Shenzhen); Shaohua Wu, Zhang Qinyu, Harbin Institute of Technology

18 Hybrid Carrier and STBC based Impulsive Noise Suppression for Substation Communications
Lin Mei, Xiang Jiao, Xiaojie Fang, Harbin Institute of Technology; Ning Zhang, Texas A & M University-Corpus Christi

19 Intelligent Partial Pattern Mode Matching Receiver for Orbital Angular Momentum Systems
Mai Kafady, Alaa ElHilaly, Yasmine Fahmy, Mohamed Khairy, Cairo University; Mohamed Abdallah, Hamad Bin Khalifa University

20 Interference Whitening per sub-band in LANs
Mostafa Ibrahim, Samsung; Ruchen Duan, Samsung Semiconductor Inc; Minki Ahn, Woookong Lee, Samsung Electronics; Ashok Ranganath, Samsung Semiconductor Inc.

Spectrum Management, Radio Access Technology, Heterogeneous Networks

1 A Cache Allocation Scheme in 5G-Enabled Inhomogeneous ICVs
Cong Wang, Chen Chen, Xidian University; Yangyang Liu, China Automotive Technology & Research Center Co.,Ltd.; Kefeng Fan, China Electronics Standardization Institute; Qingqi Pei, Xidian University

2 A New Hybrid Resource Allocation Scheme in C-V2S Systems
Incheol Hwang, Yonsei University; Hunsuoo Kim, Taehyung Kim, University of Yonsei; Daesik Hong, Yonsei University

3 A Novel Fractional Programming Approach for Two Typical Power Allocation Optimization Problems in Multi-User Massive MIMO Systems
Mingyang Chai, University of Science and Technology of China; Zhou Wuyang, University of Science and Technology of China; Zhenkun Qiu, University of Science and Technology of China; Ming Zhao, Donghui Liu, University of Science and Technology of China

4 An Asynchronous Grant-Free Multiple Access Scheme with Rateless Codes for URLLC
Wei Zhang, Shidong Zhou, Xinjun Zhang, Tsinghua University

5 An Efficient Spectral/Spatial OCDMA System Using 2D BIBD Code Based on Combinatorial Constructions of Galois Field
Teena Sharma, Université du Québec à Chicoutimi, Canada; Abdellah Chehri, University of Ottawa; Paul Fortier, Laval University

6 Channel Quality Estimation for Cognitive Wireless Systems Using Software Defined Radios
Dr. Ahmad Sadaf, Fraunhofer IKS; Henning Schepker, Peter Neuhaus, Fraunhofer IKS

7 Computation Offloading in Energy Harvesting aided Heterogeneous Mobile Edge Computing
Tian Zhang, Shandong Management University; Wei Chen, Tsinghua University

8 Coverage Analysis of Dynamic TDD in Two-Tier Heterogeneous Ultra Dense Networks
Xie Ziyi, Wu Xuanli, Xu Chen, Wei Wu, Harbin Institute of Technology

9 Edge-Cloud Based Vehicle SLAM for Autonomous Indoor Map Updating
Zepeng Zhu, Xidian University; Jiajia Liu, Northwestern Polytechnical University; Jiaodi Wang, Xidian University; NEI KATO, TOHOKU UNIVERSITY

10 Effective Capacity Maximization for Multi-Numerology based 5G NR Networks
Chia-Yu Su, Chun-Hao Fang, Kai-Ten Feng, National Chiao Tung University

11 Energy-Aware Dynamic Computation Offloading in High-Speed Railway Networks with D-TDD
QI ZHANG, HAINA ZHENG, BEIJING JIAOTONG UNIVERSITY; Zhandu Zhong, Beijing Jiaotong University

12 Energy-Efficient Multi-Tier Caching and Node Association in Heterogeneous Fog Networks
Kunjun Wang, ShanghaiTech University; Jun Li, Nanjing University of Science and Technology, China; Yang Yang, ShanghaiTech University; Wen Chen, Dept. of Electronic Engineering, Shanghai Jiao Tong Univ.; Lajos Hanzo, University of Southampton

13 Enhanced Resource Allocation for 5G V2X in Congested Smart Intersection
Su Yi, Gang Sun, Fujitsu Research and Development Center Co., Ltd; Xin Wang, Fujitsu R&D Center Co., Ltd.

14 Joint Beam Management and User Scheduling for Massive MIMO with Hybrid Beamforming and Limited Feedback
Guosen Yue, Futurewei Technologies Inc; Bohan Zhang, MediaTek USA Inc.; Xiao-Feng Qi, Futurewei Technologies Inc
Recent Results

1. A Cache Strategy for Intelligent Transportation System to Connected Autonomous Vehicles
   Wellington Viana Lobato Junior, University of Campinas; Allan M. de Souza, UNICAMP; Maycon Peixoto, UFBA; Denis Rosario, Federal University of Para (UFPA); Leandro Villas, UNICAMP

   Tossaporn Sriruksakun, Satoshi Nishida, Shuji Nambu, Kyosan Electric MFG. Co., Ltd.

   Rony Kumer Saha, Ph.D., Research Engr & Postdoc Fellow, Radi & Spec Lab, KDDI Research, Inc.

4. A High-speed Wi-SUN FAN Network by Highly-Dense Frequency Hopping
   Hidetomo Ochiia, Kiyoshi Mizutani, Ryota Okumura, Keichi Mizutani, Hiroshi Harada, Kyoto University

5. A Millimeter-Wave Reconfigurable Intelligent Metasurface Design for Vehicular Networks Applications
   Carlosتز، Inria lille; Valeria Loscri, Inria lille - Nord Europe; Mohammad Ojaroudi Parchin, Inria lille

6. A Priori Delay Information Assisted Channel Estimation with Basis Expansion Model for Aeronautical Communication Systems
   Shuzheng Fang, Lei Zhao, Ming Jiang, Sun Yat-sen University; Qilong Rong, The Seventh Research Institute of CETC

7. A Safety Gateway for Autonomous Driving Demonstrator Vehicles
   Allan Teng, Michael Stolz, Virtual Vehicle Research Center

8. A State-space Approach for Efficient Channel Tracking in OFDM 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; Atlito Gameiro, Universidade Aveiro

9. Absolute Positioning with Unsupervised Multipoint Channel Charting for 5G Networks
   Jaakko Pihlajasalo, Mike Koivisto, Jukka Talvitie, Simo Ali-Löytty, Mikko Valkama, Tampere University

10. Adaptive Channel Estimation based on Deep Learning
    Abdul karim Gizzini, ETIS, UMR8051, CY Cergy Paris Université, ENSEA, CNRS, France; Marwa Chauff, ETIS, UMR 8051, CY Cergy Paris Université, ENSEA, CNRS; Ahmad Nim, Technische Universität Dresden, Germany; Gerhard Fettweis, Technical University of Dresden

11. An Experimental Study of Uplink Co-Channel Spectrum-Sharing System between HAPS and Terrestrial Mobile Communication Networks

12. An Open Software-Defined-Radio Platform for LTE-V2X And Beyond
    Ralf Lindstedt, Martin Kasparick, Jens Pilz, Stephan Jaeckel, Fraunhofer Heinrich Hertz Institute

13. Analysis of wireless device-to-device networks under Rician fading using stochastic geometry
    Simon Demey, Université Catholique de Louvain

14. Applying Quartier-Vehicle Model Simulation for Road Elevation Measurements Utilizing the Vehicle Level Sensor
    Felix Kortmann, Leuphana University Lüneburg; Malte Rodeheger, Alexander Warnecke, HELLA GmbH & Co. KGaA; Nicolas Meier, Jens Heger, Burkhardt Funk, Paul Drews, Leuphana University Lüneburg

15. Basic Evaluation of Service Link Antenna for Footprint Fixation in HAPS System
    Shoichi Sudo, Kenji Hoshino, SoftBank Corp.; Yoshichika Ohta, Softbank Corp.

16. Challenges and Road Ahead for Wireless Networks to Serve Immersive Human Centric Applications
    Chunqing Zhang, Huawei Technologies Co., Ltd.; Gaoming He, Yan Chen, Peiying Zhu, Huawei

17. Channel-Quality Reporting Enabled by Machine Learning in Non-Stationary Environments
    Marco Centenaro, Fondazione Bruno Kessler; Stefano Tomasini, Nevio Bavenanto, University of Padova; Shaoshi Yang, Beijing University of Posts and Telecommunications

18. Codebook Design for OFDM with In-phase/Quadrature All-Index Modulation
    Wei-Wen Su, Jen-Ming Wu, National Tsing Hua University

    Wei Chen, Deng-Kai Chang, Yu-Jia Chen, National Central University

20. Compensation of Receiver IQ Imbalance in mm-wave Hybrid Beamforming Systems
    Rachit Mahendra, Indian Institute of Technology Delhi, India; Saif Khan Mohammed, Indian Institute of Technology Delhi; Ranjan K. Mallik, IIT Delhi

IoV, IoT, M2M, Sensor Networks, and Ad-Hoc Networking II

   Zhongjie He, Hangguan Shan, Zhejiang University; Yuanguo Bi, Northeastern University; Zhiyu Xiang, Zhejiang University; Zhou Su, Shanghai University; China; Weihua Wu, Tom H. Luan, Xidian University

2. Decentralized Subspace Projection for Asymmetric Sensor Networks
   Siavash Mollaebrahim Ghari, Baltasar Beferull-Lozano, Emilio Ruiz Moreno, University of Agder

3. Dynamic Routing in Flying Ad-hoc Networks using Link Duration Based MPR Selection
   Yirui Huang, Ruining Xie, Bowen Gao, Jian Wang, Nanjing University

4. Dynamic Spectrum Slicing and Optimization in SAG Integrated Vehicular Networks
   Feng Lyu, Central South University; Peng Yang, Huazhong University of Science and Technology; Huajing Wu, Conghao Zhou, University of Waterloo; Ju Ren, Central South University, China; Yaoxue Zhang, Central South University; Xuemin (Sherman) Shen, University of Waterloo

5. Eco-Vehicular Edge Networks for Connected Transportation: A Distributed Multi-Agent Reinforcement Learning Approach
   Md Ferdous Pervej, Shih-Chun Lin, North Carolina State University

6. Enhancing ETSI DCC for Multi-Service Vehicular Safety Communication
   Mohammad Ifzah Khan, Eurecom; Jérôme Harri, EURCOM; Stefania Sestia, Renault Software Labs

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   Zhongjie He, Hangguan Shan, Zhejiang University; Yuanguo Bi, Northeastern University; Zhiyu Xiang, Zhejiang University; Zhou Su, Shanghai University; China; Weihua Wu, Tom H. Luan, Xidian University

2. Decentralized Subspace Projection for Asymmetric Sensor Networks
   Siavash Mollaebrahim Ghari, Baltasar Beferull-Lozano, Emilio Ruiz Moreno, University of Agder

3. Dynamic Routing in Flying Ad-hoc Networks using Link Duration Based MPR Selection
   Yirui Huang, Ruining Xie, Bowen Gao, Jian Wang, Nanjing University

4. Dynamic Spectrum Slicing and Optimization in SAG Integrated Vehicular Networks
   Feng Lyu, Central South University; Peng Yang, Huazhong University of Science and Technology; Huajing Wu, Conghao Zhou, University of Waterloo; Ju Ren, Central South University, China; Yaoxue Zhang, Central South University; Xuemin (Sherman) Shen, University of Waterloo

5. Eco-Vehicular Edge Networks for Connected Transportation: A Distributed Multi-Agent Reinforcement Learning Approach
   Md Ferdous Pervej, Shih-Chun Lin, North Carolina State University

6. Enhancing ETSI DCC for Multi-Service Vehicular Safety Communication
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8 Hybrid Context-aware Message Flooding for Dead Spot Mitigation in V2I Communication
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9 Incentive Mechanism Design for Federated Learning in the Internet of Vehicles
Lim Wei Yang Bryan, Alibaba-NTU JRI; Zehui Xiong, Nanyang Technological University, Singapore; Dusit Niyato, Nanyang Technological University; Huang Jianqiang, Hua Xian-Sheng, Alibaba Group; Miao Chunyan, NTU SCSE, LILY Research Centre

10 Joint Power and Time Allocation of Pilot Scheme Selection for Uplink mMTC in ITS
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11 Joint Random Access Control Scheme based on PRACH Channel Quality and Access Class Barring
Xiaobo Tang, Southwest Jiaotong University

12 Leveraging the Collective Perception Service for CAM Information Aggregation at Intersections
Keno Garlachs, Caglar Kaya, Lars Wolf, Technische Universität Braunschweig

13 LSTM-Based Communication Scheduling Mechanism for Energy Harvesting RSUs in IoVs
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14 Maximum Achievable Sum Rate of CRDSA under Total Transmit Power Limitation
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2 Learning to Denoise and Decode: A Novel Residual Neural Network Decoder for Polar Codes
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3 Light-weight Machine Learning for mmWave Vehicular Communications
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4 Lottery Hypothesis based Unsupervised Pre-training for Model Compression in Federated Learning
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5 Machine Learning-based PHY-authentication for Mobile OFDM Transceivers
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7 NN-based Support Detection of Sparse Signals
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8 Off-policy Learning for Remote Electrical Tilt Optimization
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10 Towards scalable zero-shot modulation recognition
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11 Transfer Learning-Based Received Power Prediction with Ray-tracing Simulation and Small Amount of Measurement Data
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12 User Persona in Personalized Wireless Networks: A Big Data-Driven Prediction Framework
Rawan Alkurd, Carleton University; Ibrahim AbuAlhaol, Principal Data Scientist / Adjunct Professor, Halim Yanikomeroglu, Carleton University

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2 Learning based Dynamic Codebook Selection for Analog Beamforming
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3 Local-Search Based Detector for Decode-and-Forward Protocol Cooperative Systems
Issa Chiharaou, University of Tunis El Manar; Mohamed Lassaad Amnari, Paul Fortier, Laval University

4 Low-Complexity Wideband Channel Estimation for Millimeter-Wave Massive MIMO Systems via Joint Parameter Learning
Long Cheng, Guangrong Yue, Zhiqiang Wang, University of Electronic Science and Technology of China; Shaoqian Li, UESTC, China

5 Millimeter-Wave MIMO-NOMA Antenna Selection Algorithms for Space Information Network
Ziqiong Chen, Jian JIAO, Qiwen Li, Bowen Feng, Harbin Institute of Technology; Zhang Qinyu, Harbin Institute of Tech.

6 Multi-Polarization Superposition Beamforming with XPD-Aware Transmit Power Allocation
Paul Seungcheol Oh, Sean Seok-Chul Kwon, California State University Long Beach

7 Multiuser MIMO Precoded Visible Light Communication Under LED Dynamic Range Constraint
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8 Network-Coded Cooperative MIMO With Outdated CSI and CCI
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9 Outdoor Experimental Trials of Millimeter-Wave Base Station Cooperation with Digital Beamforming in High-Mobility Environments for 5G Evolution
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10 Rate Enhancement for Distributed Massive MIMO Systems with Underlay Spectrum Sharing
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11 Reliable Detection for Spatial Modulation Systems
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12 Robust Low Complexity Beamforming for Cell-Free Massive MIMO
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13 Space Shift Keying-Based Hybrid FSO/RF System
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14 Switch-Based Hybrid Analog/Digital Channel Estimation for mmWave Massive MIMO
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6 Maximum Likelihood Channel Path Detection and MMSE Channel Estimation in OTFS Systems
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7 Mitigating Cellular Interference in Uplink UAV Communications
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8 Multi-user Capacity of Cyclic Prefix Direct Sequence Spread Spectrum with Linear Detection and Precoding
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9 New Predistorter Architecture for Hybrid Beamforming Transmitter
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12 Particle Filter Based Nonlinear Data Detection for Frequency Selective mm-Wave MIMO-OFDM Systems
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13 Performance Analysis of Energy beamforming over Line-of-sight links
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15 Precoder Design for Dynamically Sub-connected Hybrid Architecture in MU-MISO-OFDM Systems
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17 Resource Allocation in Downlink Multi-carrier NOMA under a Fairness Constraint
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19 Two-Stage Phase Noise Compensation for CFBMC-OQAM under Insufficient Cyclic Prefix
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2 Link-Level Abstraction of IEEE 802.11ay based on Quasi-Deterministic Channel Model from Measurements
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3 Location-Based Operation Strategy for SIC-enabled D2D Communications
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4 Malicious users control and management in cognitive radio networks with priority queues
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6 On Beam-based Channel Reservation for URLLC in Unlicensed Spectrum
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7 Optimization of Transmission Power for NOMA in Networks with Flying Base Stations
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8 Performance Analysis and Improvement on DSRC Application for V2V Communication
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9 Performance of Memory and File Size-Aware Caching in D2D-enabled Small Cell HetNets
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10 Reconfigurable Intelligent Surface Enhanced Cognitive Radio Networks
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11 Resource Allocation in UAV-Assisted Wireless Networks Using Reinforcement Learning
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12 Resource Management in LADNs Supporting 5G V2X Communications
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4 Prediction-based Transmission-Control Codeesign for Vehicle Platooning
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5 Probabilistic Time-To-Collision:Correlation of Driver Gaze and Surrounding Objects
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6 Reinforcement Learning for Accident Risk-Adaptive V2X Networking
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7 Security Threat Analysis of Automotive Infotainment Systems
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8 Sensor Data Integrity Verification for Autonomous Vehicles Using Spread 3D Dither QIM
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9 Software Failures Prediction in Self-Driving Vehicles
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10 The integration of multiple test benches for functional verification of the cooperative ADAS
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11 To Preempt or Not: Timely Status Update in the Presence of Non-trivial Propagation Delay
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2 Non-orthogonal Multiple Access assisted Mobile Edge Computing via Device-to-Device Communications
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3 Novel Pilot Allocation Random Access Protocol for Integrated Terrestrial-Satellite Networks
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4 Optimal Power Allocation for Secure Non-orthogonal Multiple Access Transmission
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5 Performance Evaluation of FILS in a Vehicular Delay/Disruption Tolerant Network
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6 Power Optimization in Two-way AF Relaying SWIPT based Cognitive Sensor Networks
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7 QoE-Aware Coordinated Caching for Adaptive Video Streaming in High-speed Railways
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8 Secrecy Rate Performance of Cache-enabled Millimeter Wave Cellular Networks
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9 Secure Transmission in Underlay D2DCommunications Using Optimal Relay Selection
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10 Security Analysis of Network-Oblivious Internet-Wide Scan for IEEE 802.11ah Enabled IoT
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12 Spatial Indexing for System-Level Evaluation of 5G Heterogeneous Cellular Networks
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13 TCP Congestion Control Performance on a Highway in a Live LTE Network
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2 Deep Neural Network based Path Loss Analysis of Magnetic Induction Communication Systems in Underwater Pipeline
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8 Fully Convolutional Neural Networks for Automotive Radar Interference Mitigation
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9 Gamified Approach on Participatory D2D Communication in Cellular Networks
Yu Nakayama, Tokyo University of Agriculture and Technology; Masaru, Onodera; Yoshito Tobe, Aoyama Gakuin University

10 Interference Classification Using Deep Neural Networks
Jianyuan Yu, Virginia Tech; Mohammad Alhassoun, KFUPM; R. Michael Buehrer, Virginia Tech

11 Interference Management with Beamforming Utilizing Spectrum Database for Micro Operators
Tetsuaki Taniguchi, Takeo Fujii, The University of Electro-Communications

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17 Learning Based Trajectory Design for Low-Latency Communication in UAV-Enabled Smart Grid Networks
David Lee, SWUST; Xin Wang, Smart Grid Anhui Electric Power Research Institute

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19 LTE-V2X performance evaluation for cooperative collision avoidance (CoCA) systems
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2 Deep Q-Network Based Dynamic Movement Strategy in a UAV-Assisted Network
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3 Energy-Awareness Dynamic Trajectory Planning for UAV-Enabled Data Collection in nMTC Networks
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6 Meteorologically Introduced Impacts on Aerial Channels and UAV Communications
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7 Multi-agent Reinforcement Learning for Green Energy Powered IoT Networks with Random Access
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8 Network NOMA for Co-existence of Aerial and Terrestrial Users
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9 Obstacle Avoidance Algorithm Based on Human Experience Knowledge
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12 Performance Evaluation of Aerial Relaying Systems for Improving Security in Cellular Networks
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15 Trajectory Optimization for Large-scale UAV-Assisted RSLs in V2I Communication
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3 Channel Modeling Algorithm for TVWS-based IEEE 802.22 WRAN System in Rural Areas
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7 Energy Efficient mmWave NOMA Downlink Multi-Relay System for ITS
Yizhi He, Jian JIAO, Zeqiong Chen, Harbin Institute of Technology (Shenzhen); Shaohua Wu, Harbin Institute of Technology, Weiqiang Wu, Shenzhen Polytechnic; Zhang Qinyu, Harbin Institute of Tech.

8 EVM-based Performance Evaluation of Co-channel Interference Mitigation using Spatial Filtering for Digital MIMO Receivers
Sajad Golabnejhazadah, Eric Klumperink, Bram Nauta, University of Twente

9 Impact of UAV Rotation on MIMO Channel Space-Time Correlation
Zhangfeng Ma, Bo Ai, Beijing Jiaotong University; Ruisi He, Beijing JUT; Gongpu Wang, Zhandui Zhong, Mi Yang, Beijing Jiaotong University; Junchang Wang; Yujian Li, Beijing Jiaotong University

10 Packet Error Rate Based Validation Method for an OpenStreetMap Geometry-Based Channel Model
Stefan Zelenbaba, Austrian Institute of Technology; Benjammin Rainer, Austrian Institute of Technology GmbH; Markus Hofer, AIIT Austrian Institute of Technology; Anja Dakić, Austrian Institute of Technology; David Lüschenbrand, Thomas Zemen, AIIT Austrian Institute of Technology

11 Reproducing High-Speed Train Channel with the Multi-Probe Anechoic Chamber Method
Sharanya Srinivas, Daniel W. Bliss, Arizona State University

12 Comparative Performance Evaluation of mmWave 5G NR and LTE in a Campus Scenario
Mead Tehrani-Moayyed, Northeastern University; Francesco Restuccia, Stefano Basagni, Northeastern University, Institute for the Wireless Internet of Things

13 Conformal Multi-Service Antenna Arrays: Hybrid In Situ and Signal of Opportunity (SoOP) Calibration
Sharanya Srinivas, Daniel W. Bliss, Arizona State University

14 Design of Antenna Configuration for Interference Control in mmWave V2V Communication Systems
Yue Yin, Tokyo Institute of Technology; Haoze Chen, Rice University; Zongdian Li, Tokyo Institute of Technology; Ryuichi Fukatsu, Tokyo Institute of Technology; Tao Yu, Kei Sakaguchi, Tokyo Institute of Technology

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Zhangfeng Ma, Bo Ai, Beijing Jiaotong University; Ruisi He, Beijing JUT; Gongpu Wang, Zhandui Zhong, Mi Yang, Beijing Jiaotong University; Junchang Wang; Yujian Li, Beijing Jiaotong University

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35 Reproducing High-Speed Train Channel with the Multi-Probe Anechoic Chamber Method
Sharanya Srinivas, Daniel W. Bliss, Arizona State University
7 Fast Bootstrapping for Reinforcement Learning-BasedTraffic Signal Control Systems Using Queueing TheoryMaxime Tréca, Institut Vedeecom; Julian Garbiso, Vedeecom;Dominique Barth, Université de Versailles SQY; Mahdi Zargayouna,Université Gustave-Eiffel

8 Joint Offloading and Resource Allocation for ScalableVehicular Edge ComputingWei Wu, Harbin Institute of Technology; Qie Wang, Harbin Instituteof Technology; Wu Xuani, Harbin Institute of Technology; NingZhang, Texas A & M University-Corpus Christi

9 Looking into the Path Future: Extending CAMS forCooperative Event HandlingTobias Renzler, Michael Stolz, Daniel Watzenig, Graz University ofTechnology

10Modifying Network Guided Vehicle for RepeatableEcoCAR ACC Energy TestingTrevor Crain, Argonne National Laboratory

11Multi-agent Optimization for Frequency Regulationthrough Vehicle-to-Grid ApplicationsMohamed El-Hendawi, Zhanle Wang, University of Regina

12Online Re-routing for Vehicle Breakdown in ResidentialWaste CollectionMuhilan, Violet R. Syrotiuk, Arizona State University

13Regenerative Braking Control with Gear Downshiftingfor Energy Efficiency and Motion Stability Improvementof an Electrical-four-wheel-drive Hybrid VehicleChunjing Li, Zhihui Shuai, Jiangtao Gai, Guangming Zhou,Yaoheng Li, Yi Yuan, China North Vehicle Research Institute

14Requirements on Delay of VRU Context Detection forCooperative Collision AvoidanceMichel Morold, University of Kassel; Quang-Huy Nguyen,Paderborn University; Marek Bachmann, Klaus David, University ofKassel; Falko Dressler, TU Berlin

15Toward Contextual and Personalized Interior Experiencein a Vehicle: Predictive PreconditioningAlvin Chin, Jilei Tian, BMW Technology Corporation; Johann P.Prenninger, BMW Group

Future Trends and Emerging Technologies

1 A DDoS attack detection based on deep learning insoftware-defined Internet of thingsJiushuang Wang, Ying Liu, Wei Su, Huifen Feng, Beijing JiaotongUniversity

2 A Virtual Coupling Approach based on Event-triggeringControl for CBTC systems under Jamming AttacksShaomei Ma, Bing Bu, Hongwei Wang, Beijing Jiaotong University

3 Adaptive Task Allocation for Multi-agent Cooperationwith Unknown CapabilitiesJialun Li, Yushan Li, Shanghai Jiao Tong University; Yulai Weng,University of Pennsylvania; Jianping He, Shanghai Jiao Tong University

4 An Evolutionary Game Assisted Spectrum SharingBlockchain Framework for Internet of VehiclesDou Ha, Haibo Zhou, Ting Ma, Nanjing University; Kai Yu, NanJing University; Nan Cheng, Xidian University

5 Antenna Location Design for Line-of-SightCommunicationsJangwook Moon, Samsung; Hongbing Cheng, Samsung Electronics;Kee-Bong Song, Samsung Semiconductors Inc.

6 Average Reward Reinforcement Learning for OptimalOn-route Charging of Electric BusesWenzhuo Chen, Hao Liang, University of Alberta

7 Design of 5G Wireless Communications in the High-speedRailway ScenarioBaofang Duan, Cuirui Li, Jianli Xie, Lanzhou Jiaotong University

8 Edge-Cloud Resource Trade Collaboration scheme inMobile Edge ComputingWangWei, Central South University, China; Yongmin Zhang,Central South University


10 On the Performance of Code-Domain NOMA for SINwith Superimposed Pilot SchemeJunliang Zhou, Jian JIAO, Harbin Institute of Technology(Shenzhen); Weizhi Wang, Peng Cheng Laboratory; Tao Yang,Harbin Institute of Technology (Shenzhen); Shaohua Wu, HarbinInstitute of Technology; Zhang Qinyu, Harbin Institute of Tech.

11 PBFT-based ordering service for IoT domainsJelena Misevic, Vojislav Misevic, Ryerson University; Xiaolin Chang,Beijing Jiaotong University; Haytham Qushtom, Ryerson University,Toronto, Canada

12 Performance Analysis for Cache-enabled CellularNetworks with Cooperative TransmissionTianming Feng, Shao Shi, Harbin Institute of Technology; ShushiGu, Harbin Institute of Technology (Shenzhen); Ning Zhang, TexasA & M University-Corpus Christi; Wei Xiang, James CookUniversity; Xueuai Gu, Harbin Institute of Technology

13 Reliability Optimization of End-to-End Access Process ofRailway Mission Critical Video ServiceYaojia Yu, Wenyi Jiang, Bin Sun, Qingqing Wang, Jianwen Ding,Beijing Jiaotong University

IoV, IoT, M2M, Sensor Networks, and Ad-HocNetworking III

1 Momentum-Based Online Cost Minimization for TaskOffloading in NOMA-Aided MEC NetworksZewei Jing, Qinghai Yang, Xidian University; Meng Qin, PekingUniversity; Kyung Sup Kwak, Inha University

2 Multigroup Multicast Transmission via IntelligentReflecting SurfaceDong Li, Quaochi An, Yauanning SHI, Yong Zhou, ShanghaiTechUniversity

3 Multi-Objective Optimization Modeling of Clustering-BasedAgricultural Internet of ThingsEmmanuel Effah, Worcester Polytechnic Institute; Oussmane Thiare,Gaston Berger University, Senegal; Alexander Wyglinsky, WorcesterPolytechnic Institute, MA

4 Noisy Demixing: Convex Relaxation Meets NonconvexOptimizationShaoming Huang, Shanghaitech University; Yong Zhou, YauanningSHI, ShanghaiTech University

5 Non-deterministic Mobility based Incentive Mechanismfor Efficient Data Collection in CrowdsensingGuoying Zhang, Fan Hou, University of Macau; Lin Gao, HarbinInstitute of Technology, Shenzhen; Guanghua Yang, JDiNanUniversity; Lin Cai, Illinois Institute of Technology

6 On the Feasibility of In-Device Multiplexed UnlicensedD2D CommunicationsVishnu Rajendran, Gautham Prasad, Lutz Lampke, University ofBritish Columbia; Gus Vos, Sierra Wireless Inc.

7 Optimal Status Update in IoT Systems: An AgeofInformation Violation Probability PerspectiveLimei Hu, Zhengchuan Chen, Chongqing University

8 Physical Context-Aware Communication Control Methodfor Efficient AGV OperationKoseit Kobayashi, Takanori Iwai, NEC Corporation

9 Piggyback-Based Distributed MAC Optimization for V2X sidelink CommunicationsFei Peng, Zhiyuan Jiang, ShanghaiTech University; Yong Zhou,Yauanning SHI, ShanghaiTech University

10 Preliminary Performance Benchmarking of OLSRD2Using Emulated TDMA MANETs and an ODRYann Maret, Jean-Frederic Wagen, University of Applied Sciences ofWestern Switzerland
11 Scalable modulation based  Computation Offloading in Vehicular Edge Computing System
Wenjie Li, Beijing Jiaotong University; Ning Zhang, Texas A & M University- Corpus Christi; Quyan Liu, China United Network Communications Corporation Limited; Weiyang Feng, Ruirui Ning, Siyu Lin, Beijing Jiaotong University

12 Simulation Model of Bluetooth Passive Scanning for Vehicular Traffic Monitoring
Safa Boudabous, Julian Garbiso, Vedeocom; Shabbir Ali, Institut Vedeocom; Jun ZHANG, Houda LABIOD, Télécom ParisTech

13 SnB: Reduction of Consecutive Message Reception Failures in C-V2X Communications
Taeju Park, Kang G. Shin, University of Michigan

14 Three-side Dynamic Task Offloading for Smart Roads Enabled Vehicular Edge Computing
Yunpeng Wang, Quyuan Luo, Changle Li, Zhao Liu, Yilong Hui, Xidian University

15 Wake-up Control for Wireless Sensor Networks Collecting top-k Data with Temporal Correlation
Junya Shiraishi, Hiroyuki Yomo, Kansai University

Positioning, Navigation and Sensing

1 2-D high precision DOA estimation based on SVM
Yulonggao, Chen Wang, wei wang, Xu Bai, Harbin Institute of Technology

2 5G Communication Signal Based Localization with a Single Base Station
Yiwen Li, Zaichen Zhang, Liang Wu, Southeast University

3 A Descriptor Enhanced Recurrent Neural Network for Indoor Localization
Ahmed Elmoogy, Xiaodi Dong, Tao Lu, University of Victoria; Robert Westendorp, Kishore Reddy, Fortinet

4 A Novel Gain Control Method Based On Extremum Envelope For High Speed Array GPR
Xu Bai, XueRong Luo, Shizeng Guo, Long Wang, Hao Chen, Hongtao Mi, Lidong Liu, Mingjie Ji, yulonggao, Harbin Institute of Technology

5 An Improved Particle Filter for UAV Passive Tracking Based on RSS
Jun Guo, Hui Zhao, Beijing University of Posts and Telecommunications

6 An over-the-air CFO-assisted synchronization algorithm for TDOA-based localization systems
Zohreh Ebadi, Cedric Hannotier, Université libre de Bruxelles; Heidi Steendam, Ghent University; Francois Horlin, Université libre de Bruxelles; Francois Quinim, Université Libre de Bruxelles

7 Automatic Device-Location Association based on Received Signal Strength Measurements
Yulong Wang, Beijing University of Posts and Telecommunications, CSIRO; Shenghong Li, CSIRO, Marsfield, Australia; Wei Ni, CSIRO, David Abbott, Mark Johnson, CSIRO, Marsfield, Australia; Guangyu Pei, Boeing, Seattle, USA; Mark Hedley, CSIRO, Marsfield, Australia

8 Beam AoD-based Indoor Positioning for 60 GHz MmWave System
Zhong-Qing Tsai, National Chiao Tung University; Li-Hsiang Shen, National Chiao Tung University (NCTU); Kai-Ten Feng, National Chiao Tung University

9 Communication-Radar Integrated System Using 5G OFDM Signal and Mismatched Filter Reception
Hayato Watabe, University of Electro-Communications; Tomoki Abe, Yasushi Yamao, The University of Electro-Communications

10 Cooperative LIDAR Object Detection via Feature Sharing in DeepNetworks
Ehsan Emad Marvasti, Arash Rafiati, Amir Emad Marvasti, Yaser P. Fallah, University of Central Florida; Rui Guo, Toyota Motors North America; Hongsheng Lu, TOYOTA InfoTechnology Center USA

11 Cooperative Validation of CAM Position Information Using C-V2X
Fabian Eckermann, Philipp Gorczak, Christian Wietfeld, TU Dortmund University

12 Cross-Layer Interference Modeling and Performance Analysis in FMCW Radar Multiple Access Network
Sian Jin, Sumit, Roy, University of Washington

13 Data-Correlation-Based Sensor Localization for Environment Sensing with Non-Geotagged Data
Shino Shiraki, Yuto Ohashi, Shigeo Shioda, Chiba University

14 Proposal for a Compressive Measurement-Based Acoustic Vehicle Detection and Identification System
Billy Dawsor, Shigenni Ishida, Yuki Hori, Masato Uehino, Yutaka Arakawa, Kyushu University

15 Slow-Time FDA-MIMO Radar Space-Time Adaptive Processing
Cai Wen, Lin Wang, Northwest University; Yan Huang, Southeast University; Guimei Zheng, Air Force Engineering University

16 Synchronized Uplink Time of Arrival Localization: A Measurement-driven Evaluation
Keerthi Priya Dasala, Rice University; Mike MacDonald, Dragan Samardzija, Bell Labs, Nokia

17 Vehicular Dead Reckoning Based on Machine Learning and Map Matching
Lucas de Carvalho Gomes, Federal University of Rio de Janeiro; Luis Henrique M & Costa, UFRJ

Recent Results III

1 Mitigation of Human EMF Exposure in a Cellular Wireless System
Imtiaz Nasim, Florida International University; Seungmo Kim, Georgia Southern University

2 Multipath Routing with Erasure Coding in Underwater Delay Tolerant Sensor Networks
Zunli Kou, Chan Wang, Ming Lei, Zhejiang University

3 Multi-user MIMO using ZF-based Multiplexing Coordinated with User-wise Spatial Diversity
Fumiyuki Adachi, Ryo Takahashi, Tohoku University

4 New Fast Nodes for 3X3 Kernel Polar Codes
Maryam Haghighi Ardakani, University of Alberta; Muhammad Hamid, Thompson Rivers University; Masoud Ardakani, Chintia Tellambura, University of Alberta

5 Optimal Coverage Analysis of a Cellular Device-to-Device Communication Network
Darsi Jaswanta, Soumya Prakash Dash, Indian Institute of Technology Bhubaneswar; Sandeep Joshi, Samsung R&D Institute Bangalore, India

6 Optimum Sensor Value Transmission Scheduling for Linear Wireless Networked Control Systems
Kilian Kiekenap, Anja Klein, TU Darmstadt

7 PC-Signal-Based PAPR Reduction Using Null Space in MIMO Channel for MIMO-OFDM Signals under Frequency-Selective Fading Channel
Leon Yamaguchi, Tokyo University of Science; Nobuhide Nonaka, NTT DOCOMO, INC.; Kenichi Higuichi, Tokyo University of Science

8 Performance Analysis of DF based Mixed Triple Hop RF-FSO-UWOC Co-operative System
PALLAB SARMA, Indian Institute of Information Technology Guwahati; Rima Dek, Indian Institute of Information Technology Guwahati; Sanya Anees, Indian Institute of Information Technology Guwahati

9 Performance evaluation for co-channel coexistence between ITS-G5 and LTE-V2X
Pierre Roux, Valérian Mannoni, CEA
10 Post-Reception Compensation Performance of Blind Nonlinear Compensator with Equalizer against Memory Nonlinear Distortion
Hiroki Ito, Takeo Fujii, Yasushi Yamao, The University of Electro-Communications

11 Practical Evaluation of LoRa under Co-Technology Interference
Tallal El-Shabrawy, The German University of Cairo; Phoebe Edward, Mohamed ashour, German University in Cairo; Joerg Robert, FAU Erlangen-Nuremberg

Recent Results IV

1 Preamble-Based Packet Detection in Wi-Fi:A Deep Learning Approach
Vukan Ninkovic, Dejan Vukobratovic, University of Novi Sad; Aleksandar Valka, Dejan Dumić, Methods2Business

2 Preliminary Performance Baseline Testing for DSRC and C-V2X
Anjan Rayamajhi, Abey Yoseph, Animesh Balse, Zhitong Huang, Edward M. Leslie, Leidos Inc

3 Quasi-Constant-Amplitude OFDM for Wireless Communication Systems
Yuyuan CHANG, Kazuhiko Fukawa, Tokyo Institute of Technology

4 Recent Results on Proportional Fair Scheduling for mmWave-based Industrial Wireless Networks
Jiteng Ma, University of Bristol; Adnan Aijaz, Toshiba Research Europe Ltd; Mark Beach, University of Bristol

5 Reflecting the Light: Energy Efficient Visible Light Communication with Reconfigurable Intelligent Surface
Binghao Cao, Chen Ming, Southeast University; Zhaohui Yang, King’s College London; Jingwen Zhao, Southeast University; Mingzhe Chen, Princeton University

6 Scalability Analysis of Context-Aware Multi-RAT Car-to-Cloud Communication
Johannes Guldener, Christian Wietfeld, TU Dortmund University

7 Simplified Performance Analysis of OWC System Over Atmospheric Turbulence with Pointing Error
Kartik Wardhan, Syed Mohammad Zafaruddin, BITS Pilani

8 Spectrum sharing between RLANs and Fixed Satellite Services in the 6 GHz band
Nadia Yoza-Mitsuishi, Peter Mathys, University of Colorado Boulder

9 UAV-based FSO Systems using SC-QAM Signaling over Fading Channels with Misalignment
Thang Nguyen, Thanv P. Pham, University of Aizu; Dang The Ngoc, Posts & Telecommunications Institute of Technology; Anh T. Pham, University of Aizu

10 User Group Selection Method in Multiuser MIMO-OFDM Transmission with Adaptive PAPR Reduction Using Null Space in MIMO Channel
Shynaeul Shin, Tokyo University of Science; Nobuhide Nonaka, NTT DOCOMO, INC.; Kenichi Higuchi, Tokyo University of Science

Workshops

W1 - Machine Learning for Sensing, Communication and Networking in IoT

Session 1
Welcome
Waleed Ejaz, Thompson Rivers University; Shree Krishna Sharm, University of Luxembourg

1 Semi-Supervised Deep Learning Based Wireless Interference Identification for IoT Networks
Jiajia Huang, Institute for Infocomm Research, A*STAR Research Entities

2 Uncertainty-aware RAN Slicing via Machine Learning Predictions in Next-Generation Networks
Raouf Abozariba, Birmingham City University; Muhammad Kamran NAEEM, Solent University; Md Asaduzzaman, Staffordshire University; Mohammed N. Patwary, Birmingham City University

3 Estimation of Missing Data in Intelligent Transportation System
Bahareh Najafi, Saeideh Parsaeeefard, Alberto Leon-Garcia, University of Toronto

4 Deep Learning-Assisted Detection of PUE and Jamming Attacks in Cognitive Radio Systems
Mehmet Ali Aygül, Haji Furqan Madni, Mahmoud Nazzal, Istanbul Medipol University; Huseyin Arslan, University of South Florida

Closing Remarks
Waleed Ejaz, Thompson Rivers University; Shree Krishna Sharm, University of Luxembourg

Session 2
Welcome
Waleed Ejaz, Thompson Rivers University; Shree Krishna Sharm, University of Luxembourg

1 A Self Organised Workload Classification and Scheduling Approach in IoT-Edge-Cloud Ecosystem
Anirup Singh, Chandigarh University; Gagandeep Singh Ajuja, Newcastle University; Rasmeet Singh Bali, Chandigarh University; Prabhjot Kaur Chahal, Thapar Institute of Engineering and Technology; Maninderpal Singh, Chandigarh University

2 Energy-Efficient Multihop Routing Framework for Cluster-based Agricultural Internet of Things (CA-IoT)
Emmanuel Effah, Worcester Polytechnic Institute

3 Multi-band sub-GHz technology recognition on NVIDIA’s Jetson Nano
Jaron Fontaine, Adnan Shahid, Robbe Elsas, Amina Seferagic, University of Ghent; Ingrid Moerman, Ghent University - imec; Eli De Poorter, University of Ghent

4 A Fingerprint Localization Method in Collocated Massive MIMO-OFDM Systems Using Clustering and Gaussian Process Regression
Seyedeh Samira Moosavi, Paul Fortier, Laval University

Closing Remarks
Waleed Ejaz, Thompson Rivers University; Shree Krishna Sharm, University of Luxembourg

W2 - The 2nd Workshop on 5G and Beyond Technologies for Ultra-Dense Environments

Session 1
Welcome
Haesik Kim, VTT; Kenta Umebayashi, Tokyo University of Agriculture and Technology

Session 2

Keynote: Dense Spectrum Utilization with Spectrum Database for 5G
Takeo Fujii, The University of Electro-Communications
Session 2
1 Comparison Study of RF Beamforming Schemes in Hybrid Precoding for Cell-free mmWave massive MIMO UDN System
Seung-Eun Hong, Electronics and Telecommunications Research Institute
2 Design of Millimeter-wave UAV Base Station for Access Link
Masanori Ozasa, Jin Nakazato, Kousuke Hirata, Khan Tran Gia, Kei Sakaguchi, Tokyo Institute of Technology
3 Hybrid Millimeter-Wave Massive MIMO Systems with Low CSI Overhead and Few-Bit DACs/ADCs
Asil Koc, Tho Le-Ngoc, McGill University
4 On Optimizing the Secrecy Performance of RIS-Assisted Cooperative Networks
Abdullateef Almohamad, Ayman Al-Kababji, Anas Tahir, Tamer Khatib, Mazen O. Hasna, Qatar University

Session 3
1 A Theoretical Framework Toward Realizing Spectral and Energy Efficiencies of 6G Mobile Networks
Rony Kumer Saha, KDDI Research, Inc.
2 Experimental Verification of Shadowing Classification for Radio Map
Keita Katagiri, The University of Electro-Communications; Koya Sato, Tokyo University of Science; Kei Imag, Tokyo Metropolitan College of Industrial Technology; Takeo Fujii, The University of Electro-Communications
3 Joint Multilayered User Clustering and Scheduling for 5G Advanced Ultra-dense RAN
Ryo Takahashi, Hidenori Matsu, Fumiyuki Adachi, Tohoku University
4 Contention-based Grant-free Transmission with Independent Multi-pilot Scheme
Zhifeng Yuan, Weimin Li, Li Zhigang, Yihua Ma, Yuzhou HU, ZTE Corporation

W3 - Multi-Sensor Positioning and Navigation for Connected & Autonomous Vehicles

Session 1
1 Welcome
Aboelmagd Noureldin, Royal Military College of Canada; Amr El-Wakeel, Queen’s University/RMCC
2 Keynote 1
Naser El-Sheimy, University of Calgary
3 Keynote 2
Rakesh Kumar, General Motors

Session 2
1 A Quaternion Based Error State Kalman Filter for Attitude Estimation Using Low-cost MEMS MARG Sensors
Wei Ding, University of Calgary
2 Performance Analysis of MEMS-based RISS/PPP Integrated Positioning for Land Vehicles
Mohamed Elsheikh, University of Calgary; Aboelmagd Noureldin, Queen’s University; N.El-Sheimy, University of Calgary; Michael J. Korenberg, Queen’s University
3 Integration of Electronic Scanning Radars with Inertial Technology for Seamless Positioning in challenging GNSS Environments
Marwan A. Rashid, Queen’s University; Mohamed Elhabiby, Public Works Department, Ain Shams University; Omar Iqbal, Mississippi State University; Michael J. Korenberg, Queen’s University; Aboelmagd Noureldin, Royal Military College, Canada
4 Wheel-based Aiding of Low-cost IMU for Land Vehicle Navigation in GNSS Challenging Environment
Mohamed Moussa, Adel Moussa, University of Calgary; M. Elhabiby, Public Works Department Ain Shams University Cairo, Egypt; N.El-Sheimy, Department of Geomatics University of Calgary
5 A Seamless Indoor and Outdoor Low-cost Integrated Navigation System Based on LIDAR/GPS/INS
Ningbo Li, Lianwu Guan, Yanbin Gao, Harbin Engineering University, China

Session 3
1 Generalizable Sequential Camera Pose Learning Using Surf Enhanced 3D CNN
Ahmed Elmoogy, Xiaodai Dong, Tao Lu, University of Victoria; Robert Westendorp, Kishore Reddy, Fortinet
2 Linear-PoseNet: A Real-Time Camera Pose Estimation System Using Linear Regression and Principal Component Analysis
Ahmed Elmoogy, Xiaodai Dong, Tao Lu, University of Victoria; Robert Westendorp, Kishore Reddy, Fortinet
3 Robust RGB-D SLAM for Dynamic Environments Based on YOLOv4
Hanxiao Rong, Harbin Engineering University; Alex Ramirez-Serrano, University of Calgary; Jianwu Gua, Harbin Engineering University; Xiaodan Cong, Heilongjiang Academy of Sciences
Abanob Salah, Mohamed Moussa, Adel Moussa, N.El-Sheimy, University of Calgary

Session 4
1 Particle Filter Based Localization of Access Points Using Direction of Arrival on Mobile Robots
Ravi Parashar, Ramriyas Parasuraman, University of Georgia
2 Testing Vehicle-to-Vehicle Relative Position and Attitude Estimation using Multiple UWB Ranging
Ehab Ghanem, University of British Columbia - Okanagan; Kyle O’Keefe, University of Calgary; Richard Klukas, University of British Columbia - Okanagan
3 Mobility Models and the Performance of Location-based Routing in VANETs
Wahedda Jabbar, Robert Malaney, University of New South Wales
4 Intersection Mobility for Polaris Car
Anna Mazen, Mohan Krishnan, Mariam Faid, Utyaba Mohammed, Mark Paulik, University of Detroit Mercy

Session 5
1 Generalized Sequential Camera Pose Learning Using Surf Enhanced 3D CNN
Ahmed Elmoogy, Xiaodai Dong, Tao Lu, University of Victoria; Robert Westendorp, Kishore Reddy, Fortinet
2 Linear-PoseNet: A Real-Time Camera Pose Estimation System Using Linear Regression and Principal Component Analysis
Ahmed Elmoogy, Xiaodai Dong, Tao Lu, University of Victoria; Robert Westendorp, Kishore Reddy, Fortinet
3 Robust RGB-D SLAM for Dynamic Environments Based on YOLOv4
Hanxiao Rong, Harbin Engineering University; Alex Ramirez-Serrano, University of Calgary; Jianwu Gua, Harbin Engineering University; Xiaodan Cong, Heilongjiang Academy of Sciences
Abanob Salah, Mohamed Moussa, Adel Moussa, N.El-Sheimy, University of Calgary
W4 - Intelligent Communication Network Technologies (ICNET2020)

Session 1
Welcome
Syed Hassan Ahmed, JMA Wireless; Muhammad Toaha Raza Khan, Kyungpook National University

Keynote Presentation
Muhammad Toaha Raza Khan, Kyungpook National University

Session 1
1 Adaptive Sensor Data Transmission Scheduling Scheme for Smart Home Networks
YongTak Yoon, JangSoO Lee, JinHo Lee, Kyungpook National University; Kim Beomjoon, Yalae Zhelalem Jembre, Keimyung University

2 An End-to-end Intelligent Network Resource Allocation in IoV: A Machine Learning Approach
Afaq Muhammad, Talha Ahmed Khan, Khizar Abbass, Wang-Cheol Song, Jeju National University

3 BLOCK-ML: Blockchain and Machine Learning for UAV-BSs Deployment
Asad Attab, National University of Sciences and Technology (NUST), Pakistan; Noaman Ashraf, TSSG, Waterford Institute of Technology; Hassan Khalil Qureshi, National University of Sciences and Technology (NUST), Pakistan; Muhammad Toaha Raza Khan, Kyungpook National University

Session 2
1 5G Resource scheduling for Low-latency Communication: a Reinforcement Learning Approach
Qian Huang, École de technologie superieure; Xianzhong Xie, Chongqing University of Posts and Telecommunications; Bo Rong, Communications Research Centre Canada; Kadoch Michel, École de technologie superieure

2 Deep Learning Based Equalizer for MIMO-OFDM Systems with Insufficient Cyclic Prefix
Yan Sun, Huawei Technology; Chao Wang, Huawei Technologies; Huan Cai, Southeast University; Chunning Zhao, National Mobile Communications Research Lab, Southeast University; Yaqin Wu, Yan Chen, Huawei

3 Enabling Massive Access of IoT by Superposition Bloom Filter and Compressed Sensing
Zhe Luo, Fan Wang, Huawei Technologies; Mengying Ding, Yan Chen, Huawei

4 Polar Coding and Sparse Spreading for Massive Unsourced Random Access
Mengfan Zheng, Imperial College London; Yongpeng Wu, Shanghai Jiaotong University; Wenjun Zhang, Shanghai Jiao Tong University

5 Study of AI based CSI feedback under the 3GPP channel model
Wenqiang Tian, Jiejiao Tian, Yingwei Huang, OPPO; Jiajia Guo, Southeast University; Yun Fang, Wenhong Chen, OPPO Research Institute, Beijing, China.; Shi Jin, Southern University; Hao Lin, OPPO R&D, France; Jia Shen, OPPO

Session 3
Keynote Presentation
Ivo Maljevic, TELUS / University of Toronto

Session 4
1 TDOA Localization Scheme with NLOS Mitigation
Wuyang Jiang, Baogang Ding, Shanghai University of Engineering Science

2 Strategy of Relay Selection and Cooperative Jammer Beamforming in Physical Layer Security
Ming Zhang, Yong Shang, Yaohuan Zhao, Peking University, China

3 Dynamic NOMA/OMA for V2X Networks with UAV Relaying
Omrid Abbasi, Sahand University of Technology; Halim Yanikomeroglu, Carleton University; Afshin Ebrahimi, Sahand University of Technology; Nader Mokari, Tarbiat Modares University; Mohamed Alzenad, Huawei Canada Co., Ltd

4 GNC-MAC: Grouping and Network Coding-assisted MAC for Reliable Group-casting in V2X
Yue Li, Hamed Mosavat-Jahromi, Lin Cai, University of Victoria; Lei Li, Huawei Technologies Co., LTD

5 Multi-functional Coexistence of Radar-Sensing and Communication Waveforms
Mehmet Mert Sahin, Haseyn Arslan, University of South Florida

Session 5
Keynote Presentation
Jianglei Ma, Huawei Technologies

Session 6
1 An Enhanced Discontinuous Reception Mechanism for Power Saving in 5G
Feng Yi, Yuting Ji, Zeli Lao, Jiaheng Wang, Southeast University

Rony Kumer Saha, Ph.D., Research Engr & Postdoc Fellow, Radi & Science

3 Data Driven Network Slicing from Core to RAN for 5G Broadcasting Services
Ao Yu, École de technologie superieure; Kadoch Michel, École de technologie superieure; Bo Rong, Communications Research Centre Canada; Mohamed Cheriet, École de technologie superieure
4 Rate-Splitting Multiple Access: A New Frontier for the PHY Layer of 6G
Omar Dizdar, Yijie Mao, Imperial College London; Wei Han, Huawei, Shanghai; Bruno Clerckx, Imperial

5 Radio Interoperability in 5G and 6G Multiradio Base Station
Marko Leinonen, Markku Jokinen, Nuutti Tervo, Olli Kursu, Aarno Pärssinen, University of Oulu

Session 7
1 Closing Remarks
Peiying Zhu, Huawei Technologies; Halim Yanikomeroglu, Carleton University; Ivo Maljevic, TELUS / University of Toronto; Jiyong Pang, Shaobo Wang, Huawei Technologies Co. Ltd.

W6 - Network-assisted Collaborative Automated Driving

Session 1
1 Welcome
Hongsheng Lu, Rui Guo, Toyota Motor North America, InfoTech Labs
2 W6 Keynote - Cooperative Perception On Edge
Qing Yang, University of North Texas

Session 2
1 Distributed Cooperative Localization Framework via Consensus Optimization
Mahmoud Ashour, Pennsylvania State University; Ahmed Hamdi Sakr, Toyota Motor North America R&D; Rui Guo, Toyota Motors North America
2 IVS-KOM: A Reference Platform for Heterogeneous ITS Communications
Richard Jacob, TU Dresden; Matthias Gay, Fraunhofer IVI; Markus Dod, Sven Lorenz, MUGLER AG; Alexander Jungmann, IAV; Lars Franke, Joynext; Michael Philipp, NXP; Michael Klöppel-Gersdorf, Fraunhofer IIS; Matthias Haberjahn, Joynext; Erik Gruschka, IAV; Gerhard Fettweis, TU Dresden

3 Joint Optimal Relay Selection and Power Control for Reliable Broadcast Communication in Platoon
Qingji Wen, Binjie Hu, South China University of Technology
4 OrbWeaver: Towards Comparable High-Load V2X Simulations
Keno Garlichs, Alexander Willecke, Andreas-Christian Hagau, Lars Wolf, Technische Universität Braunschweig

Session 3
1 Closing Remarks
Hongsheng Lu, Rui Guo, Toyota Motor North America, InfoTech Labs

W8 - IEEE Vehicular Technology Society Workshop on Urban Air Mobility

Session 1
1 Welcome
Kamesh Nameduri, University of North Texas
2 Keynote 1: Paths to Autonomous Vehicle Operations for Urban Air Mobility
Ella Atkins, University of Michigan
3 Machine Learning-Assisted UAV Operations with UTM: Requirements, Challenges, and Solutions
Ahmed Abdel Ghany, University of Rennes; Bernard Uguen, IETR / CNRS / Université Rennes-I; Dominique Lemar, Université Rennes-I

4 Hybrid Aerial Underwater Robotic System (HAUCS): the Initial Instruments Development and Deployment
Walid Saad, Virginia Tech

Session 2
1 Keynote 2: Towards a Seamless Integration of Drones in Beyond 5G Wireless Networks
Kamesh Nameduri, University of North Texas
2 Efficient UAV Placement Strategy for Guaranteed QoS Demand
Kirtan Gopal Panda, Shrayan Das, IIT Kharagpur; Debarati Sen, Indian Institute of Technology Kharagpur
3 Multi-UAV Placement Strategy for Disaster-Resilient Communication Network
Mansi Peer, Indraprastha Institute of Information Technology, Delhi; Vivek Bohara, IIT-Delhi; Anand Srivastava, IIT DELHI

Session 3
1 Keynote 3
Philip Hall, RelmaTech Inc.
2 Determining and communicating weather risk in the new drone economy
Apoorva Bajaj, Brenda Philips, Eric Lyons, David Westbrook, Michael Zink, UMass Amherst / CASA Engineering Research Center
3 A Path from Device-to-Device to UAV-to-UAV Communications
Varaprasad Karamchedu
4 W8 Closing Remarks
Kamesh Nameduri, University of North Texas

W9 - Real-time data processing in Industrial and IoT Applications

Session 1
1 Welcome
Abdellah Chehri, University of Quebec – UQAC; Gwanggil Jeon, Incheon National University; Ahmad Awais, University of Milan

Session 2
1 A Robustness Comparison of Measured Narrowband CSI vs RSSI for IoT Localization
Ahmed Abdel Ghany, university of Rennes; Bernard Uguen, IETR / CNRS / Université Rennes-I; Dominique Lemar, Université Rennes-I
2 NRCS-CE: A Noise-Resistance UWB Channel Estimation Method for WSN and IoT Applications
Mingyang Wu, Harbin Institute of Technology
Mohammad Nazmus Sadat, University of Cincinnati; Erwin Vargas-Alfonso, University of Cincinnati; Rui Dai, university of cincinnati; Ziqian Huang, Yiling Fu, Sunmeng Lin, University of Cincinnati
### Session 1

1. **Welcome**
   Xuemin (Sherman) Shen, University of Waterloo; Shen Yan, Huawei Technologies Co., Ltd; Quan Yu, Pengcheng Lab

2. **Keynote**
   John Day, Boston University Metropolitan College

### Session 2

1. **Promoting Network Automation for Heterogeneous Networks Collaboration**
   Du Chen, Deyun Gao, Wei Quan, Qianpeng Wang, Gang Liu, Hongke Zhang, Beijing Jiaotong University

2. **Comparison of single- and multiple entry point PBFT for IoT blockchain systems**
   Jelena Misic, Vojislav Misic, Ryerson University; Xiaolin Chang, Beijing Jiaotong University

3. **A Real-time Virtual Reality Adaptive Streaming System**
   Songyuan Zhao, Tongji University; Bin Tan, Jinggangshan University; Jun Wu, Fudan University; Haqi Ren, Zhifeng Zhang, Tongji University

4. **Managing Multicast Membership for Software Defined Data Center Network**
   Yang Cheng, Dan Li, Jing Zhu, Hongnan Liu, Tsinghua University; Kai Chen, Hongkong University of Science and Technology; Jianping Wu, Tsinghua University

### Session 3

1. **Closing Remarks**
   Abdellah Chehri, University of Quebec – UQAC; Gwanggil Jeon, Incheon National University; Ahmad Awais, University of Milan

### W10 - New Network Architecture Powering Internet-of-Things

#### Session 1

1. **Welcome**
   Xuemin (Sherman) Shen, University of Waterloo; Shen Yan, Huawei Technologies Co., Ltd; Quan Yu, Pengcheng Lab

2. **Keynote**
   John Day, Boston University Metropolitan College

#### Session 2

1. **Fast-INT: Light-weight and Efficient In-band Network Telemetry in Programmable Data Plane**
   Fucong Yang, Wei Quan, Beijing Jiaotong University; Nan Cheng, Xidian University; Deyun Gao, Ziheng Xu, Beijing Jiaotong University

2. **Directed Percolation Routing for Ultra-Reliable and Low-Latency Services in Low Earth Orbit (LEO) Satellite Networks**
   Junhao Hu, Lin Cai, University of Victoria; ChengCheng Zhao, Zhejiang University; Jianping Pan, University of Victoria

3. **Prediction of Network Traffic Load on High Variability Data Based on Distance Correlation**
   Lo Pang Yun Ting, National Cheng Kung University; Tiago Koketsu Rodrigues, Tohoku University; Nei Kato, Tohoku University; Kun-Ta Chuang, National Cheng Kung University

4. **Trust-driven Distributed Self-collaborative Security Architecture of IoT Based on Blockchain and Smart Contracts**
   Hongzhe Li, Southwest Jiaotong University; Sirun Xu, AgilePhotonics Technology Co., Ltd; Saifei Li, GuangCheng Sun, Xiaowei Zhang, Lianshan Yan, Southwest Jiaotong University
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