The 11th International Conference on

Wireless Communications and Signal Processing

October 23-25, 2019, Xi'an, China

Contents

Greetings from the General Co-Chairs

On behalf of the executive committee, it is our great pleasure to invite you to participate in the 2019 International Conference on Wireless Communications and Signal Processing (WCSP 2019), which will be held in Xi'an, Shaanxi, China, during Oct. 23-25, 2019.

WCSP is an annual International Conference on Wireless Communications and Signal Processing (WCSP). The aim of the conference is to provide an international forum that brings together researchers from academia and practitioners from industry to exchange advances in recent research work on all aspects of wireless communications and signal processing. With the support of all participants, the past ten events of the conference have been very successful. We are now organizing WCSP 2019, the 11th edition of the conference. You are cordially welcome to participate in and contribute to the conference in your valuable role.

Xi'an is a famous cultural city with a long history. As one of the four major ancient capitals in the world, Xi'an retains the prosperity of the thirteen-generation ancient capitals of Zhou, Qin, Han and Tang dynasties with the history of more than 3100 years of city-building and more than 1100 years of capital-building. Ancient "Silk Road" started from this, and the city of ancient Chang'an, with a population of millions, constituted the then world trade and cultural center.   Surrounded by terracotta warriors and horses, Ming City Wall, Hanyang Mausoleum, Huangdi Mausoleum, Famen Temple and many other world-class relics, as well as natural resources such as the Central National Forest Park—the Qinling Mountains, Xi'an is always the most respected tourist attractions for people all over the world.

We warmly welcome you all to Xi'an in October 2019, look forward to your participation and thank for you attention.

Prof. Jinkang Zhu, University of Science and Technology of China, China
Prof. Shihua Zhu, Xi'an Jiaotong University, China
Prof. G. B. Giannakis, University of Minnesota, USA

WCSP 2019 General Co-Chairs

Welcome Message from the TPC Co-Chairs

The 11th WCSP this year, first move from the eastern area of China to western area of China, which implies a new start for this conference. On behalf the Technical Program Committee, I will now briefly introduce the Technical Program of WCSP 2019.

WCSP 2019 consists of nine symposia, including Wireless Communications Symposium, Future Networks Symposium, and Signal Processing for Communications Symposium, 5G & Beyond Symposium, Network and Information Security Symposium, Optical Communications Symposium, Space Information Communications and Networks Symposium, Intelligent Informatics and Big Data Symposium, and Multimedia and Communications Symposium. The technical program committee consists of 297 members from all over the world. We received totally 744 paper submissions, and each submission was carefully peer-reviewed by at least three reviewers working in the areas. After being rigorously reviewed, 299 papers have been selected for inclusion in the technical program and oral presentation at in the conference, which is equivalent to an acceptance ratio of about 40%.

The technical program of WCSP 2019 includes five keynote talks and 50 technical sessions, which cover a diversity of topics in the areas of wireless communications, signal processing, and artificial intelligence. We are pleased to present you five keynote speeches which will be delivered by Prof. Weihua Zhuang from University of Waterloo, The Academician of the Chinese Academy of Sciences, Prof. Zongben Xu from Xi'an Jiaotong University, Dr. Yi Wang from Huawei Technologies Co. Ltd., Prof. Hamid Jafarkhani from University of California, and Prof. Zhengdao Wang from Iowa State University. All the above speakers are world-wide renowned academic and industry leaders in the areas of wireless communications and signal processing. We hope that you will find the technical program interesting, informative, and stimulating.

The technical program would not have been possible without the efforts of all symposium co-chairs, TPC members, and the reviewers who volunteered their time and professional expertise. We take this opportunity to thank all of them for their hard work and great support. We also thank all the authors who have submitted their papers and contributed their quality work to this conference. Moreover, we thank our sponsors and partners, University of Science and Technology of China, Xi'an Jiaotong University, IEEE, IEEE Communications Society, Army Engineering University of PLA, Nanjing University of Posts and Telecommunications, Southeast University, Zhejiang University, CIC Communications and Signal Processing Society, China Institute of Electronics on Communication Society, Shaanxi Institute of Communications for their support and contribution. Special thanks are given to our Patrons: Huawei Co., Ltd. and Posts and Telecom Press Co., Ltd.

Finally, we hope that you will enjoy the technical program of the conference and wish you all a pleasant stay at the conference and in the beautiful city, Xi'an.

Zhengyuan Xu, University of Science and Technology of China, China
Martin Haenggi, University of Notre Dame, USA
Cheng-Xiang Wang, Southeast University, China
Guoqiang Mao, University of Technology Sydney, AUS

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WCSP 2019 Technical Program Committee

Technical Program Committee Co-Chairs

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Martin Haenggi	(University of Notre Dame, USA)
Cheng-Xiang Wang	(Southeast University, China)
Guoqiang Mao	(University of Technology Sydney, AUS)

Technical Symposium Co-Chairs

1. Wireless Communications Symposium

Li Sun	(Xi'an Jiaotong University, China)
Caijun Zhong	(Zhejiang University, China)
Michalis Matthaiou	(Queen's University Belfast，UK)
Wei Xu	(Southeast University, China)
Cheng Li	(Memorial University of Newfoundland, Canada)

2. Future Networks Symposium

Zuqing Zhu	(University of Science and Technology of China, China)
Hui Yang	(Beijing University of Posts and Telecommunications, China)
Carlos Natalino De Silva	(KTH Royal Institute of Technology, Sweden)
Xiaoliang Chen	(University of California, Davis, USA)
Enjie Ding	(China University of Mining and Technology, China)

3. Signal Processing for Communications Symposium

Yongpeng Wu	(Shanghai JiaoTong University, China)
Shengli Zhang	(Shenzhen University, China)
Junhui Zhao	(East China Jiao Tong University, China)
Quan Zhou	(Nanjing University of Posts and Telecommunications, China)

4. 5G & Beyond Symposium

Qingwen Liu	(Tongji University, China)
Yan Chen	(Huawei Technology, China)
Honggang Wang	(University of Massachusetts Dartmouth, USA)
Weiwei Yang	(Army Engineering University of PLA, China)

5. Network and Information Security Symposium

Zhou Su	(Xi'an Jiaotong University, China)
Yulong Zou	(Nanjing University of Posts and Telecommunications, China)
Zesong Fei	(Beijing Institute of Technology, China)

6. Optical Communications Symposium

Chen Gong	(University of Science and Technology of China, China)
Ming Jiang	(Sun Yat-Sen University, China)

7. Space Information Communications and Networks Symposium

Chunxiao Jiang   (Tsinghua University, China)
Giovanni Giambene   (University of Siena, Italy)
Qinyu Zhang   (Harbin Institute of Technology, China)
Chenhao Qi   (Southeast University, China)

8. Intelligent Informatics and Big Data Symposium

Cong Shen   (University of Virginia)
Xiang Chen   (Sun Yat-Sen University, China)
Jie Xu   (University of Miami, USA)
Jing Yang   (Pennsylvania State University, USA)

9. Multimedia and Communications Symposium

Yan Chen   (University of Electronic Science and Technology of China, China)
Liang Zhou   (Nanjing University of Posts and Telecommunications, China)
Joel J. P. C. Rodrigues (National Institute of Telecommunications- Inatel, Brazil)
Hua Huang   (Beijing Institute of Technology, China)

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Keynote Speakers

Keynote Talk 1:
Service Provisioning in 5G Communication Networks

Prof. Weihua Zhuang, IEEE Fellow, Fellow of the Royal Society of Canada, the Canadian Academy of Engineering, the Engineering Institute of Canada University of Waterloo, Canada

Abstract

The fifth generation (5G) communication networks will accommodate a wide range of emerging services with diverse service quality requirements. The network will integrate a variety of network resources and technologies to support high transmission rate and to enhance quality of experience to mobile users. The traditional one-size-fits-all network architecture cannot efficiently meet the needs of different services, due to the poor scalability, limited adaptability, and inflexibility. Network function virtualization (NFV) enabled by software defined networking (SDN) technology is a promising approach for an agile and flexible 5G networking infrastructure. In this presentation, we will provide an overview of several recent studies for 5G core networks, including computing and transmission resource allocation, establishment of a customized virtual network topology for multicast services, and networking protocol for reliable end-to-end data delivery.

Biography

Dr. Weihua Zhuang has been with the Department of Electrical and Computer Engineering, University of Waterloo, Canada, since 1993, where she is a Professor and a Tier I Canada Research Chair in Wireless Communication Networks. She is the recipient of 2017 Technical Recognition Award from IEEE Communications Society Ad Hoc & Sensor Networks Technical Committee, and a co-recipient of several best paper awards from IEEE conferences. Dr. Zhuang was the Editor-in-Chief of IEEE Transactions on Vehicular Technology (2007-2013), Technical Program Chair/Co-Chair of IEEE VTC Fall 2017 and Fall 2016, and the Technical Program Symposia Chair of the IEEE Globecom 2011. She is a Fellow of the IEEE, the Royal Society of Canada, the Canadian Academy of Engineering, and the Engineering Institute of Canada. Dr. Zhuang is an elected member in the Board of Governors and VP Publications of the IEEE Vehicular Technology Society.

23, Oct 2019, 10:30am-11:15am

Keynote Talk 3:
The marriage between AI and Math

Prof. Zongben Xu, Academician of the Chinese Academy of Sciences
Xi'an Jiaotong University, Xi'an, China

Abstract

This talk first gives a generalized framework of artificial intelligent from the perspective of mathematics. Then the fundamental mathematical problems in AI are put forward and discussed. Finally, the talk shows some important applications of AI in mathematics, including optimization and partial differential equation.

Biography

Zong-Ben Xu, a member of the Chinese Academy of Sciences, is a mathematician and an expert in signal and information processing. He received his MS degree in mathematics in 1981 from Northwest University, China and PhD degree in applied mathematics in 1987 from Xi`an Jiaotong University, China. He now serves as professor of mathematics and computer science, and director of the Institute for Information and System Sciences. In 2007, he was appointed as a Chief Scientist of National Basic Research Program of China (973 Project).

His current research interest includes intelligent information processing, machine learning and theories in numerical modeling. He proposes the L(1/2) regulation theory, which serves as foundations for sparse microwave imaging. He also discovers and proves Xu-Roach Theom in machine learning, which solves several difficult problems in neural networks and simulated evolutionary computation，and provides a general deduction criteria for machine learning and nonlinear analysis under Non-Euclidean framework. Lastly, he initiates new modeling theories and methodologies based on visual cognition, and formulates series of new algorithms for clustering analysis, discriminant analysis, and latent viable analysis, which have been widely applied to science and engineering. He is owner of the National Natural Science Award of China in 2007，and winner of CSIAM Su Buchin Applied Mathematics Prize in 2008. He delivered a sectional talk at International Congress of Mathematicians (ICM 2010) upon the invitation of the congress committee.

23, Oct 2019, 11:15am-12:00am

Keynote Talk 3:

Energy-Efficient Node Deployment in Heterogeneous Wireless Sensor Networks

Prof. Hamid Jafarkhani, IEEE Fellow, Fellow of AAAS
University of California, Irvine, USA

Abstract

Wireless networks of the future are envisioned to be highly heterogeneous. In many applications, one is interested in optimally deploying a network of nonidentical nodes to a certain area of interest. These networks may include a multitude of connected autonomous nodes in one or more tiers. We formulate these deployment problems as quantizer design problems where different distortion measures should be associated with different quantization indices.

We discuss fundamental design challenges like the best spatial deployment of nodes to minimize the energy consumption or maximize the sensing accuracy while guaranteeing network connectivity. This is done by developing a quantization theory of heterogeneous reproduction points. We will discuss the characteristics of the heterogeneous networks with optimal deployment.

Biography

Hamid Jafarkhani is a Chancellor's Professor at the Department of Electrical Engineering and Computer Science, University of California, Irvine, where he is also the Director of Center for Pervasive Communications and Computing and the Conexant-Broadcom Endowed Chair. He was a Visiting Scholar at Harvard University in 2015 and a Visiting Professor at California Institute of Technology in 2018. Among his awards are the IEEE Marconi Prize Paper Award in Wireless Communications, the IEEE Communications Society Award for Advances in Communication, and the IEEE E. Sumner Award.

Dr. Jafarkhani is listed as a highly cited researcher in http:\\www.isihighlycited.com. According to the Thomson Scientific, he is one of the top 10 most-cited researchers in the field of "computer science" during 1997-2007. He is a Fellow of AAAS, an IEEE Fellow, and the author of the book "Space-Time Coding: Theory and Practice."

24, Oct 2019, 10:30am-11:15am

Keynote Talk 4:
5G positioning is coming

Dr. Yi Wang, Huawei Fellow
**Huawei Technologies, Co., Ltd., China**

Abstract

Location information is becoming an essential feature for more and more applications and services which will change our daily life with smart city, smart industry factory, and automotive driving. Recently 3GPP NR agreed to the positioning requirements and use cases including regulatory service and a wide diversity of vertical industry cases. 5G shall provide much higher positioning performances than all previous cellular systems – thank to the large bandwidth and massive MIMO features of 5G. It is expected that 5G positioning will be as important as 5G connectivity in supporting the 5G services of vertical industries.

In this talk, an overview on the latest 3GPP 5G standard progress will be given including highlights on the key technologies and its roadmap. In addition, the Huawei prototype of 5G positioning with results will be presented, and finally we envision the positioning for beyond 5G and future.

Biography

Dr. Yi Wang is a research expert at Huawei Technologies Co., Ltd. in Shanghai. He received the M.S.E.E and Ph.D degrees from information engineering department at Beijing University of Posts & Telecommunications, China, in 1997 and 2000 respectively. He was one of the initial researchers of FuTURE program in 863 when he worked in Tsinghua University during 2000-2002. He visited the University of Kiel in Germany as senior researcher during 2002-2004. Since 2005 he joined Huawei Technologies Co., Ltd. in Shanghai he led a series of research projects on LTE/LET-Advanced and 5G systems. Currently he is leading 5G positioning and sensor research in Huawei. Dr. Yi Wang owns over 150+ patents and 90+ papers. Many patents have been realized in LTE/LTE-Advanced and 5G products and adopted in 3GPP and IEEE802.11 standards.

Dr. Wang is the board member of NYU Wireless Industrial Affiliates since 2014. He is the chair of China IMT-2020 (5G) mmWave Technology since 2013. He was the vice chair of WWRF WG4 during 2008-2010. Dr. Wang has been the delegate of 3GPP, IEEE802, Mobile VCE (UK), and WWRF from Huawei. He did much efforts in bridging Huawei research and IEEE conferences.
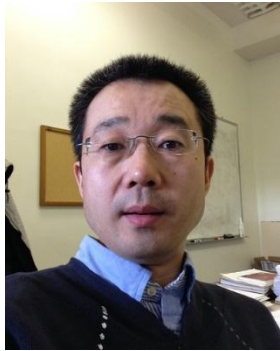
Keynote Talk 5:
Signaling Design for Internet-of-Things Applications

Prof. Zhengdao Wang, IEEE Fellow
IEEE Fellow Iowa State University, USA

Abstract

It is generally accepted that Internet-of-Things (IoT) is the natural extension of the Internet. While many IoT devices have access to stable power sources and can basically employ similar transmission and reception schemes as in general wireless communication transceivers, there are a large number of low-power and resource-limited IoT devices that are severely constrained in the power/energy available and processing capability that can be used for wireless communications. In this talk, we take another look at the wireless communication signaling design for IoT devices with the power constraints and limited processing complexity in mind, and try to identify suitable modulation, coding, and multiple access schemes for IoT applications.

Biography

Zhengdao Wang received his B.S. degree in Electronic Engineering and Information Science from the University of Science and Technology of China (USTC), 1996, the M.Sc. degree in Electrical and Computer Engineering from the University of Virginia, 1999, and Ph.D. in Electrical and Computer Engineering from the University of Minnesota, 2002. He is now with the Department of Electrical and Computer Engineering at the Iowa State University. His interests are in the areas of signal processing, communications, information theory and machine learning. He served as an Associate Editor for IEEE Transactions on Vehicular Technology, IEEE Signal Processing Letters, and IEEE Transactions on Signal Processing, IEEE Signal Processing Society Online Video Library, and IEEE Transactions on Wireless Communications. He currently serves as an Editor for ZTE Communications and Journal of Radar. He was a co-recipient of the IEEE Signal Processing Magazine Best Paper Award in 2003 and the IEEE Communications Society Marconi Paper Prize Award in 2004, and the EURASIP Journal on Advances in Signal Processing Best Paper Award, in 2009. He is an IEEE Fellow.

Schedule at a glance

Time	Oct. 23 (Wednesday)	Oct. 24 (Thursday)	Oct. 25 (Friday)
08:30-09:15	**Opening Ceremony** **&** **10-Year Anniversary Award Ceremony** Grand Ball Room, 5th Floor	**/**	**S-25: Blockchain and Emerging Technologies** Conference Room 1, 5th Floor **S-26: Network Protocols** Conference Room 2, 5th Floor **S-27: Edge Computing II** Conference Room 3, 5th Floor **S-28: Satellite Communications I** Conference Room 4, 5th Floor
09:15-10:00	**Keynote Speech: Service Provisioning in 5G Communication Networks** **Prof. Weihua Zhuang** **University of Waterloo, Canada** Grand Ball Room, 5th Floor	**Keynote Speech: 5G positioning is coming** **Dr. Yi Wang** **Huawei Technologies Co. Ltd., China** Grand Ball Room, 5th Floor	**S-29: End-to-End Service Provisioning** Conference Room 5, 5th Floor **S-30: UAV Networks I** Multimedia Room I, 5th Floor **S-31: UAV Networks II** Multimedia Room II, 6th Floor
10:00-10:30		Coffee Break	
10:30-11:15	**Keynote Speech: The marriage between AI & Math** **Prof. Zongben Xu** **Xi'an Jiaotong University, China** Grand Ball Room, 5th Floor	**Keynote Speech: Signaling Design for Internet-of-Things Applications** **Prof. Zhengdao Wang** **Iowa State University, USA** Grand Ball Room, 5th Floor	**S-32: Vehicular Communications I** Conference Room 1, 5th Floor **S-33: Performance Analysis and Optimization II** Conference Room 2, 5th Floor **S-34: Optical Communications II** Conference Room 3, 5th Floor **S-35: Performance Analysis and Optimization I** Conference Room 4, 5th Floor
11:15-12:00	**Keynote Speech: Energy-Efficient Node Deployment in Heterogeneous Wireless Sensor Networks** **Prof. Hamid Jafarkhani** **University of California, Irvine, USA** Grand Ball Room, 5th Floor	**Break**	**S-36: D2D Communications** Conference Room 5, 5th Floor **S-37: Internet of Things I** Multimedia Room I, 5th Floor **S-38: Internet of Things II** Multimedia Room II, 6th Floor
12:00-14:00		Lunch Break	
14:00-15:30	**S-01: Coded Communications** Conference Room 1, 5th Floor **S-02: Beamforming Technologies** Conference Room 2, 5th Floor **S-03: Wireless Networking I** Conference Room 3, 5th Floor **S-04: Optical Communications I** Conference Room 4, 5th Floor **S-05: MIMO Systems I** Multimedia Room I, 5th Floor **S-06: MIMO Systems II** Multimedia Room II, 6th Floor	**S-13: Power Allocation over Wireless Networks II** Conference Room 1, 5th Floor **S-14: Edge Computing I** Conference Room 2, 5th Floor **S-15: Heterogeneous Data Processing** Conference Room 3, 5th Floor **S-16: Radar Technologies** Conference Room 4, 5th Floor **S-17: Deep Learning towards Smart Networks I** Multimedia Room I, 5th Floor **S-18: Deep Learning towards Smart Networks II** Multimedia Room II, 6th Floor	**S-39: Localization Systems I** Conference Room 1, 5th Floor **S-40: User Behaviors and Security in Networks** Conference Room 2, 5th Floor **S-41: Localization Systems II** Conference Room 3, 5th Floor **S-42: Network Optimization I** Conference Room 4, 5th Floor **S-43: Information Security I** Multimedia Room I, 5th Floor **S-44: Information Security II** Multimedia Room II, 6th Floor
15:30-16:00		Coffee Break	
16:00-17:30	**S-07: Communications and Signal Processing over New Environments I** Conference Room 1, 5th Floor **S-08: Power Allocation over Wireless Networks I** Conference Room 2, 5th Floor **S-09: Communications and Signal Processing over New Environments II** Conference Room 3, 5th Floor **S-10: Image and Video Processing** Conference Room 4, 5th Floor **S-11: Resource Allocation for Wireless Networks I** Multimedia Room I, 5th Floor **S-12: Resource Allocation for Wireless Networks II** Multimedia Room II, 6th Floor	**S-19: Network Optimization II** Conference Room 1, 5th Floor **S-20: Coding and Modulation II** Conference Room 2, 5th Floor **S-21: Channel Modeling** Conference Room 3, 5th Floor **S-22: Coding and Modulation I** Conference Room 4, 5th Floor **S-23: Channel Estimation I** Multimedia Room I, 5th Floor **S-24: Channel Estimation II** Multimedia Room II, 6th Floor	**S-45: Precoding Technologies I** Conference Room 1, 5th Floor **S-46: Signal Estimation and Detection I** Conference Room 2, 5th Floor **S-47: Future Network in Mining Industry** Conference Room 3, 5th Floor **S-48: Signal Estimation and Detection II** Conference Room 4, 5th Floor **S-49: Learning-Driven Communications I** Multimedia Room I, 5th Floor **S-50: Learning-Driven Communications II** Multimedia Room II, 6th Floor
18:30-20:30	**Welcome Reception**	**Banquet** **Award Ceremony**	**Dinner**

Overview of Day 1

	WCSP 2019 Technical Program on Oct. 23, 2019					
09:00-09:15	Opening and Welcome Ceremony Prof. Prof. Prof.					
09:15-10:00	Keynote Talk 1: **Service Provisioning in 5G Communication Networks** **Prof. Weihua Zhuang**, IEEE Fellow University of Waterloo, Canada					
10:00-10:30	Coffee Break					
10:30-11:15	Keynote Talk 2: Prof.					
11:15-12:00	Keynote Talk 3: **Energy-Efficient Node Deployment in Heterogeneous Wireless Sensor Networks** **Prof. Hamid Jafarkhani**, IEEE Fellow University of California, Irvine, USA					
12:00-14:00	Lunch Break					
14:00-15:30	Coded Communications Conference Room 1, 5th Floor	Beamforming Technologies Conference Room 2, 5th Floor	Wireless Networking I Conference Room 3, 5th Floor	Optical Communications I Conference Room 4, 5th Floor	MIMO Systems I Multimedia Room I, 5th Floor	MIMO Systems II Multimedia Room II, 6th Floor
15:30-16:00	Coffee Break					
16:00-17:30	Communications and Signal Processing over New Environments I Conference Room 1, 5th Floor	Power Allocation over Wireless Networks I Conference Room 2, 5th Floor	Communications and Signal Processing over New Environments II Conference Room 3, 5th Floor	Image and Video Processing Conference Room 4, 5th Floor	Resource Allocation for Wireless Networks I Multimedia Room I, 5th Floor	Resource Allocation for Wireless Networks II Multimedia Room II, 6th Floor
18:30-20:30	Welcome Reception					

Overview of Day 2

WCSP 2019 Technical Program on Oct. 24, 2019					
09:00-09:15	Opening and Welcome Ceremony Prof. Prof. Prof.				
09:15-10:00	Keynote Talk 1: Prof.				
10:00-10:30	Coffee Break				
10:30-11:15	Keynote Talk 4: **5G positioning is coming** **Dr. Yi Wang**, Huawei Fellow Huawei Technologies, Co., Ltd., China				
11:15-12:00	Keynote Talk 5: **Signaling Design for Internet-of-Things Applications** **Prof. Zhengdao Wang**, IEEE Fellow IEEE Fellow Iowa State University, USA				
12:00-14:00	Lunch Break				
14:00-15:30	Power Allocation over Wireless Networks II Conference Room 1, 5th Floor	Edge Computing I Conference Room 2, 5th Floor	Heterogeneous Data Processing Conference Room 3, 5th Floor	Radar Technologies Conference Room 4, 5th Floor	Deep Learning towards Smart Networks I Multimedia Room I, 5th Floor	Deep Learning towards Smart Networks II Multimedia Room II, 6th Floor
15:30-16:00	Coffee Break				
16:00-17:30	Network Optimization II Conference Room 1, 5th Floor	Coding and Modulation II Conference Room 2, 5th Floor	Channel Modeling Conference Room 3, 5th Floor	Coding and Modulation I Conference Room 4, 5th Floor	Channel Estimation I Multimedia Room I, 5th Floor	Channel Estimation II Multimedia Room II, 6th Floor
18:30-20:30	Banquet				

Overview of Day 3

WCSP 2019 Technical Program on Oct. 25, 2019						
8:30-10:00	Blockchain and Emerging Technologies Conference Room 1, 5th Floor	Network Protocol Conference Room 2, 5th Floor	Edge Computing II Conference Room 3, 5th Floor	Satellite Communications I Conference Room 4, 5th Floor	End-to-End Service Provisioning Conference Room 5, 5th Floor	UAV Networks I Multimedia Room I, 5th Floor	UAV Networks II Multimedia Room II, 6th Floor
10:00-10:30	Coffee Break						
10:30-12:00	Vehicular Communications I Conference Room 1, 5th Floor	Performance Analysis and Optimization II Conference Room 2, 5th Floors	Optical Communications II Conference Room 3, 5th Floor	Performance Analysis and Optimization I Conference Room 4, 5th Floor	D2D Communications Conference Room 5, 5th Floor	Internet of Things I Multimedia Room I, 5th Floor	Internet of Things II Multimedia Room II, 6th Floor
12:00-14:00	Lunch Break						
14:00-15:30	Localization Systems I Conference Room 1, 5th Floor	User Behaviors and Security in Networks Conference Room 2, 5th Floors	Localization Systems II Conference Room 3, 5th Floor	Network Optimization I Conference Room 4, 5th Floor		Information Security I Multimedia Room I, 5th Floor	Information Security II Multimedia Room II, 6th Floor
15:30-16:00	Coffee Break						
16:00-17:30	Precoding Technologies I Conference Room 1, 5th Floor	Signal Estimation and Detection I Conference Room 2, 5th Floors	Future Network in Mining Industry Conference Room 3, 5th Floor	Signal Estimation and Detection II Conference Room 4, 5th Floor		Learning-Driven Communications I Multimedia Room I, 5th Floor	Learning-Driven Communications II Multimedia Room II, 6th Floor

Wednesday, October 23

Wednesday, October 23, 14:00 - 15:30

Session S-01: Coded Communications
Conference Room 1, 5th Floor
Wednesday, October 23, 14:00 - 15:30
Conference Chairs: Jie Qiu (Sun Yat-sen University, P.R. China)

Construction of Finite Field Based QC-LDPC Codes from Isomorphism Perspective

> Huaan Li (Xidian University, P.R. China); Hengzhou Xu (Zhoukou Normal University, P.R. China); Baoming Bai, Min Zhu and Ji Zhang (Xidian University, P.R. China)

A Reduced-Complexity ADMM Based Decoding Algorithm for LDPC Codes

> Zhibiao Liang, Xiang Chen and Xinghua Sun (Sun Yat-sen University, P.R. China); LiJun Zhai (Application and Technology on Aerospace Information Laboratory CETC, P.R. China)

Concatenated Reed-Solomon/Spatially Coupled LDPC Codes

> Jie Qiu, Shiqiu Liu and Li Chen (Sun Yat-sen University, P.R. China)

Tabu-List Noisy Gradient Descent Bit Flipping Decoding of LDPC Codes

> Li Zhang, Nan Liu and Zhiwen Pan (Southeast University, P.R. China); Xiaohu You (National Mobile communication Research Lab., Southeast University, P.R. China)

A Graph-Neural-Network Decoder with MLP-based Processing Cells for Polar Codes

> Xuran Song, Zhaoyang Zhang, Jue Wang and Kangjian Qin (Zhejiang University, P.R. China)

Secure Communication Based on Fountain Code and Channel Feedback

> Dantong Huang and Li Sun (Xi'an Jiaotong University, P.R. China)

Session S-02: Beamforming Technologies
Conference Room 2, 5th Floor
Wednesday, October 23, 14:00 - 15:30
Conference Chairs: Qian Xu (Xi'an Jiaotong University, P.R. China)

Efficient Hybrid Beamforming for Multi-Group Multicasting in mmWave Systems

> Zihuan Wang, Yanan Ma, Hongyu Li, Ming Li and Qian Liu (Dalian University of Technology, P.R. China)

Wireless Content Caching in Sliced Cellular Networks with Multicast Beamforming

> Kan Wang, Wenchao Ji, Junhuai Li and Wang Huaijun (Xi'an University of Technology, P.R. China); Ting Cao (Xi'an University of Technology, P.R. China)

Beamforming in Distributed Antenna Systems Based on Successive Convex Approximation and Dual Decomposition

> Zhiyuan Li (University of Science and Technology of China, P.R. China); Chen Li (University of Science And Technology of China, P.R. China); Xiaohui Chen and Weidong Wang (University of Science and Technology of China, P.R. China)

Location-Aware mmWave Beamforming Based on Kernel Trick

Bin Yang (University of Science and Technology of China, P.R. China); Chen Li (University of Science And Technology of China, P.R. China); Weidong Wang (University of Science and Technology of China, P.R. China)

Hybrid Beamforming for MISO Multicasting with Finite-Resolution Phase Shifters

Junwei Wang, Xiaoling Hu, Jiang Zhu, Caijun Zhong and Zhaoyang Zhang (Zhejiang University, P.R. China)

Secure MISO Beamforming Optimization with Randomly Distributed Eavesdroppers and Interferers

Chenguang Zhu, Jing Xu and Jiang Xue (Xi'an Jiaotong University, P.R. China)

Session S-03: Wireless Networking I

Conference Room 3, 5th Floor
Wednesday, October 23, 14:00 - 15:30
Conference Chairs: Alemu Jorgi Muhammed (SouthWest Jiaotong University, P.R. China)

A Stackelberg Game for Cooperative Cognitive Wireless Powered Communication Networks with Multiple Primary Users

Qun Li and Ding Xu (Nanjing University of Posts and Telecommunications, P.R. China)

A Fine-grained Analysis of Wireless Powered Communication with Poisson Cluster Process

Siyuan Zhou, Jinhang Zhao, Guoping Tan and Xujie Li (Hohai University, P.R. China)

On the Construction of Data Aggregation Tree with Maximized Lifetime in Wireless Sensor Networks

Hui Wang and Hongbin Chen (Guilin University of Electronic Technology, P.R. China)

A FAHP and MPTCP Based Seamless Handover Method in Heterogeneous SDN Wireless Networks

Haonan Tong, Xuanlin Liu and Changchuan Yin (Beijing University of Posts and Telecommunications, P.R. China)

Resource Allocation for Energy Efficiency in NOMA Enhanced Small Cell Networks

Alemu Jorgi Muhammed (SouthWest Jiaotong University, P.R. China); Zheng Ma (Sourth West Jiao Tong University, P.R. China); Zhengquan Zhang and Pingzhi Fan (Southwest Jiaotong University, P.R. China)

Age of Information Aware Channel Allocation for Wireless Industrial Networks

Bowen Liu (Shanghai JiaoTong University, P.R. China); Cunqing Hua (Shanghai Jiao Tong University, P.R. China); Pengwenlong Gu (TELECOM ParisTech, France)

Session S-04: Optical Communications I

Conference Room 4, 5th Floor
Wednesday, October 23, 14:00 - 15:30
Conference Chairs: Xianqing Jin (University of Science and Technology of China, P.R. China)

A Novel Adaptive Stochastic Resonance Scheme for Underwater Optical Wireless Communication

Zhao Feng (University of Science and Technology of China, P.R. China); Shangbin Li (USTC, P.R. China); Zhengyuan Xu (University of Science and Technology of China, P.R. China)

The LD and Quantum Dot-Based White Light Sources for Joint Lighting and Visible Light Communications

Shangbin Li (USTC, P.R. China); Xianqing Jin (University of Science and Technology of China, P.R. China); Chen Gong and Shuang Liang (USTC, P.R. China); Qiqi Pan and Zhengyuan Xu (University of Science and Technology of China, P.R. China)

Integrated Wearable Indoor Positioning System Based on Visible Light Positioning and Inertial Navigation Using Unscented Kalman Filter

Zhitian Li, Wuhao Yang, Linhui Xiao, Xingyin Xiong, Zheng Wang and Xudong Zou (Institute of Electronics, Chinese Academy of Sciences, P.R. China)

Positioning Error Analysis of Indoor Visible Light Positioning Using Dual Cameras

Haoming Liu (University of Science and Technology of China, P.R. China); Chen Gong (USTC, P.R. China); Jianghua Luo (Zhongshan Zhongchuang Technology Research Institute of Opto-electronics Industry, P.R. China); Zhengyuan Xu (University of Science and Technology of China, P.R. China)

A Photon-Counting Micro-LED Array Based Indoor Optical Wireless Communication System: Design and Experiment

Jiarong Shi, Xiaolin Zhou, Jie Lu, Hongfei Ge and Pengfei Tian (Fudan University, P.R. China)

Analytical Models for Resonant Beam Communications

Mingliang Xiong and Qingwen Liu (Tongji University, P.R. China); Gang Wang (University of Minnesota & Beijing Institute of Technology, USA); Georgios B. Giannakis (University of Minnesota, USA); Sihai Zhang (University of Science and Technology of China, P.R. China); Chuan Huang (University of Electronic Science and Technology of China, P.R. China)

Session S-05: MIMO Systems I

Multimedia Room I, 5th Floor
Wednesday, October 23, 14:00 - 15:30
Conference Chairs: Yan Chen (Huawei, P.R. China)

Online Calibration of Phase Shifter Network for mmWave Massive MIMO Systems in Multipath Channels

Xizixiang Wei, Yi Jiang and Xin Wang (Fudan University, P.R. China)

Doppler Spread Suppression for Massive MIMO High-Mobility CoMP Uplink Transmission

Zhinan Hu (Xi'an JiaoTong University, P.R. China); Weile Zhang (Xi'an Jiaotong University, P.R. China)

Analysis of Millimeter-Wave Channel Characteristics Based on Channel Measurements in Indoor Environments at 39 GHz

Xue Zhang (Beijing University of Posts and Telecommunications, P.R. China); Gang Qiu (ZTE Corporation, P.R. China); Jianhua Zhang (Beijing University of Posts and Telecommunications, P.R. China); Lei Tian (Beijing University of Posts and Telecommunications & Wireless Technology Innovation Institute, P.R. China); Pan Tang and Tao Jiang (Beijing University of Posts and Telecommunications, P.R. China)

Spectrum Efficiency Optimization for Uplink Massive MIMO System with Imperfect Channel State Information

Yuheng Du, Xiangbin Yu, Xi Wang, Qiuming Zhu and Tao Liu (Nanjing University of Aeronautics and Astronautics, P.R. China)

Supervised Learning-Based Semi-Blind Detection for Generalized Space Shift Keying MIMO Systems

Chengcheng Xu, Shuaishuai Guo, Haixia Zhang, Chuanting Zhang and Cong Liang (Shandong University, P.R. China)

Performance Analysis of Mixed-ADC MIMO Systems over Rayleigh Channels Based on Random Matrix Theory

Hang Gao and Kexin Xiao (Shanghai Jiao Tong University, P.R. China); Yao Yao (Huawei Technologies Co., Ltd., P.R. China); Bin Xia (Shanghai Jiao Tong University, P.R. China)

Session S-06: MIMO Systems II

Multimedia Room II, 6th Floor
Wednesday, October 23, 14:00 - 15:30
Conference Chairs: Gaojie Chen (University of Leicester, United Kingdom (Great Britain))

Deep Learning for Compressed Sensing Based Channel Estimation in Millimeter Wave Massive MIMO

Wenyan Ma and Chenhao Qi (Southeast University, P.R. China); Zaichen Zhang (National Mobile Communications Research Laboratory, Southeast University, P.R. China); Julian Cheng (University of British Columbia, Canada)

Impact of Height and Downtilt of Base Station Antenna for Millimeter-Wave Communication Networks with 3D LoS Probability

Xiang Liu (Shanghai Institute of Microsystem and Information Technology (SIMIT), P.R. China); Jing Xu (East China Normal University, P.R. China); Ruijun Shu (Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, P.R. China); Yingrui Li (Shanghai Institute of Microsystem and Information Technology (SIMIT), P.R. China)

Design of Rectangular Antenna Array Structure for Massive MIMO

Xiang Gao and Xianfeng Liu (University of Electronic Science and Technology of China, P.R. China)

Capacity Enhancement Using Cooperative Distributed Antenna System in Downlink High-Speed Train Environments

Yue Xin, Zhonghua Liang, Yimeng Bai, Chenhui Zhai and Wei Li (Chang'an University, P.R. China)

User-Coupling Angle-Domain Adaptive Filtering Based Multiuser MIMO Frequency Synchronization

Yinghao Ge and Weile Zhang (Xi'an Jiaotong University, P.R. China); Zhinan Hu (Xi'an JiaoTong University, P.R. China)

Optimal Fairness in Device Pairing with Antenna Selection for Uplink NOMA in Massive M2M Networks

Zaid Abdullah, Gaojie Chen and Jonathon Chambers (University of Leicester, United Kingdom (Great Britain))

Wednesday, October 23, 16:00 - 17:30

Session S-07: Communications and Signal Processing over New Environments I

Conference Room 1, 5th Floor

Wednesday, October 23, 16:00 - 17:30

Conference Chairs: Shimin Feng (China University of Mining and Technology, P.R. China)

Mutli-Radio Rapid Handover Technology in Underground Mine Wireless Communication Networks

Feng Jin (BGRIMM Technology Group, P.R. China)

Two-Stage Power Allocation for Cooperative NOMA in D2D Communications with Imperfect CSI

Tianqi Xing and Nan Ma (Beijing University of Posts and Telecommunications, P.R. China); Ping Zhang (WTI-BUPT, P.R. China)

Rolling Bearing Fault Feature Extraction and Diagnosis Method Based on MODWPT and DBN

Xiaohong Ren, Hong Wan, Xiao Yu, Shoupeng Wu and Enjie Ding (China University of Mining and Technology, P.R. China)

Research on Mine Safety Situation Prediction Model: The Case of Gas Risk

Li Dingwei, Li Shuang and You Mengjie (China University of Mining and Technology, P.R. China)

Performance Analysis and Mode Selection in Fog Computing Based Cooperative Vehicular Networks

Zhuojun Hu and Shi Yan (Beijing University of Posts and Telecommunications, P.R. China)

Network Calculus-based Modeling of Time Sensitive Networking Shapers for Industrial Automation Networks

Xiaoyu Liu and Chi Xu (Shenyang Institute of Automation, Chinese Academy of Sciences, P.R. China); Haibin Yu (Shenyang Institute of Automation China Academy of Sciences, P.R. China)

Session S-08: Power Allocation over Wireless Networks I

Conference Room 2, 5th Floor

Wednesday, October 23, 16:00 - 17:30

Conference Chairs: Yan Chen (Huawei, P.R. China)

Joint Channel Assignment and Power Allocation for NOMA-based D2D Communications with Imperfect CSI

Tianqi Xing and Nan Ma (Beijing University of Posts and Telecommunications, P.R. China); Ping Zhang (WTI-BUPT, P.R. China)

Secure Transmission for UAV-Aided NOMA Networks with SWIPT via Precoding Optimization

Wei Wang (Dalian University of Technology, P.R. China); Jie Tang (South China University of Technology, P.R. China); Nan Zhao and Xin Liu (Dalian University of Technology, P.R. China); Xiuyin Zhang (South China University of Technology, P.R. China); Yunfei Chen (University of Warwick, United Kingdom (Great Britain)); Yi Qian (University of Nebraska - Lincoln, USA)

Artificial Noise Assisted MISO System-Power Allocation and Its SDR Implementation

Fuchao Yan, Weixiao Meng, Shuai Han and Yiliang Liu (Harbin Institute of Technology, P.R. China)

Power Allocation for Downlink Multiuser NOMA-Based Generalized Spatial Modulation

Zijie Hong, Guoquan Li, Lin Jinzhao, Yongjun Xu and Xiangyun Zhou (Chongqing University of Posts and Telecommunications, P.R. China)

A Novel Energy-Efficient Power Allocation for D2D Communications Underlaying Cellular Network

Ruilu Chen and Fengfeng Shi (Southeast University, P.R. China); Chunming Zhao (National Mobile Communications Research Laboratory, Southeast University, P.R. China)

Optimal Power Allocation for Minimizing Outage Probability of UAV Relay Communications

Jia Zhu, Yulong Zou and Hui Tu (Nanjing University of Posts and Telecommunications, P.R. China)

Session S-09: Communications and Signal Processing over New Environments II

Conference Room 3, 5th Floor
Wednesday, October 23, 16:00 - 17:30
Conference Chairs: Chenkai Zou (University of Science and Technology of China, P.R. China)

Handover Procedure Design and Performance Optimization Strategy in LEO-HAP System

Kailun Li (University of Science and Technology of China, P.R. China); Yitao Li (USTC, P.R. China); Zhenkun Qiu (University of Science and Techonology of China, P.R. China); Qi Wang (University of Science and Technology of China, P.R. China); Junqi Lu (Unit 32039 of PLA, P.R. China); Wuyang Zhou (University of Science and Technology of China, P.R. China)

QoE-Driven Optimization for Video Services in Cache-Enabled Software-Defined HetNets

Chenkai Zou, Hancheng Lu and Jianwen Meng (University of Science and Technology of China, P.R. China)

Waveform Optimization for Non-orthogonal CP-FBMA System

Yuhao Qi (Southeast University, P.R. China); Jian Dang (Southeast University & National Mobile Communications Research Laboratory, P.R. China); Zaichen Zhang (National Mobile Communications Research Laboratory, Southeast University, P.R. China); Liang Wu (Southeast University, P.R. China)

A Frequency Reconfigurable Microstrip Patch Antenna Based on Liquid Metal and PDMS

Keyue Zhang, Jingzhou Zhang, Songchang Zhang, Zhi Cao and Yongning He (Xi'an Jiaotong University, P.R. China)

Prototype Filter Design Using Genetic Algorithm for Orientated Sidelobe Energy Suppression in FBMC

Siying Lv, Junhui Zhao and Shanjin Ni (Beijing Jiaotong University, P.R. China)

A Shifted Constellation of QPSK: Constellation Design and Dynamic Demodulation Threshold Optimization

Rugui Yao, Yuan Zhang and Xiaoya Zuo (Northwestern Polytechnical University, P.R. China); Xu Zhang (China China Academic of Space Technology, P.R. China); Jiahong Li and Pan Liu (Xi'an Institute of Space Radio Technology, P.R. China); Wu Qihong (Northwestern Polytechnical University, P.R. China)

Session S-10: Image and Video Processing

Conference Room 4, 5th Floor

Wednesday, October 23, 16:00 - 17:30

Conference Chairs: Yongkai Huo (Shenzhen University, United Kingdom (Great Britain))

Multi-Modal Image Fusion via a Novel Multi-scale Edge-preserving Decomposition

Chuanzhen Rong (Army Engineering University of PLA, P.R. China); Yongxing Jia (Communications Engineering College & Army Engineering University of PLA, P.R. China)

Content-aware Deep Perceptual Image Compression

Yiping Duan (Tsinghua University, P.R. China); Yaqiang Zhang (Harbin Institute of Technology, P.R. China); Xiaoming Tao and Chaoyi Han (Tsinghua University, P.R. China); Mai Xu (University of Beihang, P.R. China); Cheng Yang (Cross-strait Tsinghua Research Institute, P.R. China); Jianhua Lu (Tsinghua University, P.R. China)

A Novel Method for Refocusing Maritime Targets in SAR Images

Di Cheng and Bo Yuan (University of Science and Technology, P.R. China); Chang Chen (University of Science and Technology of China, P.R. China); Weidong Chen (University of Science & Technology of China, P.R. China)

Hybrid-order and Multi-stream Convolutional Neural Network for Fine-grained Visual Recognition

Yang Liu, Hengrui Gu, Chunguo Li, Qinzhen Xu and Luxi Yang (Southeast University, P.R. China)

Local Feature Hashing with Graph Regularized Binary Auto-encoder for Face Recognition

Jing Chen and Yunxiao Zu (Beijing University of Posts and Telecommunications, P.R. China)

PHD: A Deep Learning Based Human Detection Framework for Panoramic Videos

Jinting Tang and Zhenhui Chen (Shenzhen University, P.R. China); Yongkai Huo (Shenzhen University, United Kingdom (Great Britain)); Peichang Zhang (Shenzhen University, P.R. China)

Session S-11: Resource Allocation for Wireless Networks I

Multimedia Room I, 5th Floor

Wednesday, October 23, 16:00 - 17:30

Conference Chairs: Qingwen Liu (Tongji University, P.R. China)

Energy-Efficient Resource Allocation in Uplink NOMA Systems with Deep Reinforcement Learning

YuHan Zhang (NanJing University of Posts and Telecommunication, P.R. China); Xiaoming Wang (Nanjing University of Posts and Telecommunications, P.R. China); Youyun Xu (Nanjing University of Posts and Telecommunications & Shanghai Jioatong University, P.R. China)

Resource Allocation in Switched-Beam Based mmWave MIMO CRAN

Jia-Ming Liu (Southeast University & National Mobile Communications Research Laboratory, P.R. China); Jun-Bo Wang (Southeast University, P.R. China); Jin-Yuan Wang (Nanjing University of Posts and Telecommunications, P.R. China); Chuanwen Chang (The 28th Research Institute of China Electronics Technology Group Corporation, P.R. China); Min Lin (Nanjing University of Posts and Telecommunications, P.R. China); Ming Chen (Southeast University, P.R. China)

Optimal Resource Allocation for Full-Duplex Wireless-Powered Relaying with Self-Energy Recycling

> Shizhao Yang and Yuan Ren (Xi'an University of Posts and Telecommunications, P.R. China); Guangyue Lu (Xi'an University of Posts & Telecommunications, P.R. China); Jin Wang (XI'AN University of Posts&Telecommunications, P.R. China)

Resource Allocation in Opportunistic Cooperative Cognitive Radio Network with PU's Statistical Delay QoS Provisioning

> Tao Wang, Yichen Wang and Zhuang Li (Xi'an Jiaotong University, P.R. China); Zhangnan Wang (Xi`an Jiaotong University, P.R. China)

Energy-Efficient Resource Allocation in Downlink GFDM-NOMA Networks

> Yonghai Lin, Zhen Yang and Haiyan Guo (Nanjing University of Posts and Telecommunications, P.R. China)

Robust Resource Allocation and Transmission Time Optimization for OFDMA-based Heterogeneous Networks

> Yongjun Xu (Chongqing University of Posts and Telecommunications, P.R. China); Yang Yang (Chongqing University of Posts and Telecommunications & School of Communication and Information Engineering, P.R. China); Guoquan Li and Qilie Liu (Chongqing University of Posts and Telecommunications, P.R. China)

Session S-12: Resource Allocation for Wireless Networks II

Multimedia Room II, 6th Floor
Wednesday, October 23, 16:00 - 17:30
Conference Chairs: Haotong Cao (Nanjing University of Posts and Telecommunications, P.R. China)

Predictive Resource Allocation with Interference Coordination by Deep Learning

> Zhaoqi Xu, Jia Guo and Chenyang Yang (Beihang University, P.R. China)

Joint Access Control and Resource Allocation for mMTC Based on Tagged Preamble

> Zhuang Li, Yichen Wang and Tao Wang (Xi'an Jiaotong University, P.R. China); Zhangnan Wang (Xi`an Jiaotong University, P.R. China)

Efficient Virtualized Resources Allocation in Network Virtualization Environment: A Service Oriented Perspective

> Haotong Cao, Shengchen Wu, Feng Tian and Longxiang Yang (Nanjing University of Posts and Telecommunications, P.R. China)

Automatic Differentiation Based Resource Allocation Algorithm for Heterogeneous Networks

> Zhenhao Zhang and Hui Li (University of Science and Technology of China, P.R. China)

Dynamic Downlink Resource Allocation Based on Imperfect Estimation in LEO-HAP Cognitive System

> Shiqi Wang (University of Science and Technology of China, P.R. China); Yitao Li (USTC, P.R. China); Qi Wang (University of Science and Technology of China, P.R. China); Man Su (Beijing Institute of Tracking and Telecommunication Technology, P.R. China); Wuyang Zhou (University of Science and Technology of China, P.R. China)

Lightweight Mask R-CNN for Long-Range Wireless Power Transfer Systems

> Hao Li, Aozhou Wu, Wen Fang, Qingqing Zhang, Mingqing Liu and Qingwen Liu (Tongji University, P.R. China); Wei Chen (Tsinghua University, P.R. China)

Thursday, October 24

Thursday, October 24, 14:00 - 15:30

Session S-13: Power Allocation over Wireless Networks II

Conference Room 1, 5th Floor

Thursday, October 24, 14:00 - 15:30

Conference Chairs: Peng Lin (Shandong University, P.R. China)

Cost Efficient Power Allocation, User Association and Energy Management in H-CRAN with Hybrid Energy Sources

> Peng Lin and Piming Ma (Shandong University, P.R. China); Yanbo Ma (Shandong University of Finance and Economics, P.R. China); Wencong Han (Shandong University, P.R. China)

Random Fourier Features Extended Kernel Recursive Least p-Power Algorithm

> Wei Gao and Yi Xu (Jiangsu University, P.R. China); Lihuan Huang (Northwestern Polytechnical University, P.R. China)

Joint Wireless Power and Information Transfer for Primary Secure Transmission

> Rui Song, Xiao Tang, Dawei Wang and Daosen Zhai (Northwestern Polytechnical University, P.R. China); Woping Xu (Donghua University, P.R. China); Bin Li (Northwestern Polytechnical University, P.R. China)

Power Threshold Game for Covert Communication in Relay Networks with an Active Warden

> Jianquan Wang and Yuanxin Sun (University of Electronic Science and Technology of China, P.R. China); WanBin Tang (University of Electronic Science & Technology of China, P.R. China); Xiaoping Li and Shaoqian Li (University of Electronic Science and Technology of China, P.R. China)

Optimal Beam Power Control for Co-existing Multibeam GEO and LEO Satellite System

> Rui Li and Cunqing Hua (Shanghai Jiao Tong University, P.R. China); Pengwenlong Gu (TELECOM ParisTech, France)

An Optimized Power Model of Heterogeneous BBU Pool in Super Base Station Architecture

> Yingjiao Ma (Beijing University of Posts and Telecommunications, P.R. China); Jinglin Shi and Lin Tian (Institute of Computing Technology, Chinese Academy of Sciences, P.R. China); Yiqing Zhou (Chinese Academy of Science, P.R. China); Hongqiang Mu and Jinlong Hu (Institute of Computing Technology, Chinese Academy of Sciences, P.R. China); Qian Sun (ICT/CAS, P.R. China); Zongshuai Zhang (Institute of Computing Technology, Chinese Academy of Sciences, P.R. China)

Session S-14: Edge Computing I

Conference Room 2, 5th Floor

Thursday, October 24, 14:00 - 15:30

Conference Chairs: Qian Xu (Xi'an Jiaotong University, P.R. China)

Machine Learning Based Task Scheduling for Wireless Powered Mobile Edge Computing IoT Networks

Jianqi Xie, Sihua Wang and Changchuan Yin (Beijing University of Posts and Telecommunications, P.R. China)

Service Proactive Caching Based Computation Offloading for Mobile Edge Computing

Zhaokun Zhou (University of Chongqing, P.R. China); Feifei Han (Ludong University, P.R. China)

Optimal Offloading Strategy in NOMA-Assisted Mobile Edge Computing

Donghui Liu, Ming Zhao and Wuyang Zhou (University of Science and Technology of China, P.R. China)

Privacy-Preserving Pedestrian Detection for Smart City with Edge Computing

Danni Yuan, Xiaoyan Zhu, Yaoru Mao, Wenbin Zheng and Tao Wu (Xidian University, P.R. China)

Age-of-Information for Computation-Intensive Messages in Mobile Edge Computing

Qiaobin Kuang (Sun Yat-sen University & School of Electronics and Information Technology, P.R. China); Jie Gong, Xiang Chen and Xiao Ma (Sun Yat-sen University, P.R. China)

Computation Offloading and Resource Allocation in Mobile Edge Computing via Reinforcement Learning

Danfeng Wang and Jian Zhao (Nanjing University, P.R. China)

Session S-15: Heterogeneous Data Processing

Conference Room 3, 5th Floor

Thursday, October 24, 14:00 - 15:30

Conference Chairs: Xiaoyan Zhu (Xidian University, P.R. China)

Recursive Implementation of Gaussian Process Regression for Spatial-Temporal Data Modeling

Ye Kuang (The Chinese University of Hong Kong, Shenzhen, Shenzhen, P.R. China); Tianshi Chen (The Chinese University of Hong Kong, Shenzhen, P.R. China); Feng Yin (The Chinese University of Hong Kong (Shenzhen), P.R. China); Renxin Zhong (Sun Yat-sen University, P.R. China)

Error Resilience of Haptic Data in Interactive Systems

Yiwen Xu, Yaping Huang, Weiling Chen, Hong Xue and Tiesong Zhao (Fujian Key Lab for Intelligent Processing and Wireless Transmission of Media Information ,Fuzhou University)

Fountain Code Transmission in Dual Connectivity Based on Partial Overlapped Data

Wenyan Ding, Pinyi Ren and Qinghe Du (Xi'an Jiaotong University, P.R. China)

A Hybrid Data and Model Transfer Framework for Distributed Machine Learning

Jiamei Yan, Zhaoyang Zhang, Wei Wang, Xiaoming Chen, Caijun Zhong and Chunguang Li (Zhejiang University, P.R. China)

Efficient Data Collection in Large-Scale UAV-aided Wireless Sensor Networks

Jiahui Chen (Southeast University, P.R. China); Feng Yan (National Mobile Communications Research Laboratory, Southeast University, P.R. China); Shenshen Mao (Southeast University, P.R. China); Fei Shen (Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, P.R. China); Weiwei Xia (National Mobile Communications Research Laboratory, Southeast University, P.R. China); Yi Wu (Fujian normal university, P.R. China); Lianfeng Shen (National Mobile Communications Research Laboratory, Southeast University, P.R. China)

Efficient and Privacy-Preserving Edit Distance Query over Encrypted Genomic Data

> Yandong Zheng and Rongxing Lu (University of New Brunswick, Canada); Jun Shao (Zhejiang Gongshang University, P.R. China); Yonggang Zhang (Jilin University, P.R. China); Hui Zhu (Xidian University, P.R. China)

Session S-16: Radar Technologies

Conference Room 4, 5th Floor

Thursday, October 24, 14:00 - 15:30

Conference Chairs: Cui-Qin Dai (Chongqing University of Posts and Telecommunications, P.R. China)

A Joint Low-Rank and Sparse Approach for Mitigating Clutter in Through-the-Wall Radar

> Chen Huang, Hongqing Liu, Zhen Luo and Yi Zhou (Chongqing University of Posts and Telecommunications, P.R. China); Trieu-Kien Truong (I-Shou University, Taiwan)

Intelligent Coordinated Task Scheduling in Space-Air-Ground Integrated Network

> Cui-Qin Dai, Xian Li and Qianbin Chen (Chongqing University of Posts and Telecommunications, P.R. China)

Interference Suppression Based Gesture Recognition Method with FMCW Radar

> Zedong Zhao, Yong Wang, Mu Zhou, Xiaolong Yang and Liang Bo Xie (Chongqing University of Posts and Telecommunications, P.R. China)

Sum-rate Optimization for Radar and Communication Coexistence

> Tianxiong Wang, Jingxuan Huang, Xinyi Wang, Siqiang Wang and Fei Zesong (Beijing Institute of Technology, P.R. China)

Radar-Communication Integrated Neighbor Discovery for Wireless Ad Hoc Networks

> Danna Ji, Zhiqing Wei, Xu Chen, Chenyang Han, Qian Chen, Zhiyong Feng and Fan Ning (Beijing University of Posts and Telecommunications, P.R. China)

Hybrid SVM-CNN Classification Technique for Moving Targets in Automotive FMCW Radar System

> Teng Gao, Qisong Wu, Zhichao Lai and Zengyang Mei (Southeast University, P.R. China)

Session S-17: Deep Learning towards Smart Networks I

Multimedia Room I, 5th Floor

Thursday, October 24, 14:00 - 15:30

Conference Chairs: Chungang Yang (Xidian University, P.R. China)

A Multi-level Feature Fusion Network for Real-time Semantic Segmentation

> Lu Wang and Qinzhen Xu (Southeast University, P.R. China); Zixiang Xiong (Texas A&M University & Monash University, USA); Yongming Huang and Luxi Yang (Southeast University, P.R. China)

An Actor-Critic Deep Reinforcement Learning Based Computation Offloading for Three-tier Mobile Computing Networks

> Yu Liu, Qimei Cui, Jian Zhang, Yu Chen and Yanzhao Hou (Beijing University of Posts and Telecommunications, P.R. China)

Design of Active Learning Framework for Collaborative Anomaly Detection

> He Cai and Cunqing Hua (Shanghai Jiao Tong University, P.R. China); Wenchao Xu (The Hong Kong Polytechnic University, Hong Kong)

Regularized Training Framework for Combining Pruning and Quantization to Compress Neural Networks

> Qimin Ding and Ruonan Zhang (Northwestern Polytechnical University, P.R. China); Yi Jiang (Northwestern Polytechnical University & School of Electronics and Information, P.R. China); Daosen Zhai and Bin Li (Northwestern Polytechnical University, P.R. China)

HEVC Compression Artifact Reduction with Generative Adversarial Networks

> Shiqi Yu (FUZHOU University, P.R. China); Bolin Chen, Yiwen Xu, Weiling Chen and Zhonghui Chen (Fuzhou University, P.R. China); Tiesong Zhao (FUZHOU University, P.R. China)

CapsHash：Deep Supervised Hashing with Capsule Network

> Yang Li (Army Engineering University of PLA, P.R. China); Rui Zhang, Zhuang Miao and Jiabao Wang (Army Engineering University of PLA)

Session S-18: Deep Learning towards Smart Networks II

Multimedia Room II, 6th Floor
Thursday, October 24, 14:00 - 15:30
Conference Chairs: Zhengdao Wang (Iowa State University, USA)

A Generative Adversarial Network Based Framework for Specific Emitter Characterization and Identification

> Jialiang Gong (USTC, P.R. China); Xiaodong Xu (University of Science and Technology of China, P.R. China); Yufeng Qin and Weijie Dong (ZTE Corporation, P.R. China)

Temporal-Spatial Prediction of Trip Demand Using Neural Networks and Points of Interest

> Xingxing Hu and Qimei Cui (Beijing University of Posts and Telecommunications, P.R. China); Kwang-Cheng Chen (University of South Florida, USA)

Battery Panel Defect Detection Method Based on Deep Convolutional Neural Network

> Shibao Jiang, Taotao Wang and Shengli Zhang (Shenzhen University, P.R. China); Wei Wang (Shenzhen Toplab Artificial Intelligence Technology Co. Ltd, P.R. China); Hui Wang (Shenzhen University, P.R. China)

Feature Extraction Based on Manifold Learning for Radio Fingerprint

> Qiaolin Pu (Hong Kong Baptist University, Hong Kong); Tianshu Tang and Fawen Zhang (Chongqing University of Posts and Telecommunications, P.R. China)

Selector-Actor-Critic and Tuner-Actor-Critic Algorithms for Reinforcement Learning

> Ala'eddin Masadeh, Zhengdao Wang and Ahmed E. Kamal (Iowa State University, USA)

Deep Reinforcement Learning for Scheduling in Cellular Networks

> Jian Wang (Huawei Techologies, P.R. China); Chen Xu, Yourui Huangfu and Rong Li (Huawei Technologies, Co. Ltd., P.R. China); Yiqun Ge (Huawei Technologies Canada Inc., Canada); Jun Wang (Huawei Technologies Co. Ltd, P.R. China)

Thursday, October 24, 16:00 - 17:30

Session S-19: Network Optimization II
Conference Room 1, 5th Floor
Thursday, October 24, 16:00 - 17:30
Conference Chairs: Deli Qiao (East China Normal University, P.R. China)

Discovering Urban Functional Regions with Call Detail Records and Points of Interest: A Case Study of Guangzhou City

Sihui Zheng, Shaohang Xie and Xiang Chen (Sun Yat-sen University, P.R. China)

Energy-Efficient Channel Access Considering Data Priority in Cognitive Radio Sensor Networks

Hanmeng Yang and Hongbin Chen (Guilin University of Electronic Technology, P.R. China)

Age Minimization for Status Update Systems with Packet Based Transmissions over Fading Channels

Deli Qiao (East China Normal University, P.R. China); M. Cenk Gursoy (Syracuse University, USA)

Relaying Threshold Based Random Access and Data Transmission Scheme for Grouped Massive MTC Networks

Zihuan Yang and Yichen Wang (Xi'an Jiaotong University, P.R. China); Zhangnan Wang (Xi`an Jiaotong University, P.R. China); Tao Wang (Xi'an Jiaotong University, P.R. China)

A Packet Aggregation Scheme for WIA-PA Networks Based on Wireless Channel State

Heng Wang, Liuqing Chen, Dongliang Xu and Min Li (Chongqing University of Posts and Telecommunications, P.R. China)

On the Performance Analysis of Active Visual 3D Reconstruction in Multi-agent Networks

Qier An and Yuan Shen (Tsinghua University, P.R. China)

Session S-20: Coding and Modulation II
Conference Room 2, 5th Floor
Thursday, October 24, 16:00 - 17:30
Conference Chairs: Yinghao Ge (Xi'an Jiaotong University, P.R. China)

Quadrature Joint Transmitter-receiver Spatial Modulation

Rui Dong and Fanggang Wang (Beijing Jiaotong University, P.R. China); Junshan Luo (National University of Defense Technology, P.R. China); Dong Wang (Beijing Jiaotong University, P.R. China)

Learned Turbo-type Affine Rank Minimization

Xuehai He (University of Electronic Science and Technology of China, P.R. China); Zhipeng Xue (ShanghaiTech University, P.R. China); Xiaojun Yuan (University of Electronic Science and Technology of China, P.R. China)

The Performance of Coded Modulation with Gallager Mapping in the Finite Length Regime

Chong Zhang (Institute of Computing Technology, CAS. & University of Chinese Academy of Sciences, P.R. China); Xijin Mu (Institute of Computing Technology, Chinese Academy of Sciences, P.R. China); Jinhong Yuan (University of New South Wales, Australia); Yiqing Zhou (Chinese Academy of Science, P.R. China); Jinglin Shi (Institute of Computing Technology, Chinese Academy of Sciences, P.R. China)

Repair Bandwidth Cost of Generalized Regenerating Codes for Clustered Distributed Storage

 Ke Li (Harbin Institute of Technology(ShenZhen), P.R. China); Shushi Gu (Harbin Institute of Technology, Shenzhen, P.R. China); Ye Wang (Harbin Institute of Technology (Shenzhen), P.R. China); Qinyu Zhang (Shenzhen Graduate School, Harbin Institute of Technology, P.R. China); Wei Xiang (James Cook University, Australia)

Deep Learning-based Automatic Modulation Recognition Algorithm in Non-Cooperative Communication Systems

 Zhimin He, Yang Peng, Yu Wang, Jie Yang and Guan Gui (Nanjing University of Posts and Telecommunications, P.R. China)

Diversity Analysis for Spatial Scattering Modulation in Millimeter Wave MIMO System

 Shengzhen Ruan and Bin Hu (Lanzhou University, P.R. China); Kyeong Jin Kim (Mitsubishi Electric Research Laboratories (MERL), USA); Qiang Li (Huazhong University of Science and Technology, P.R. China); Lei Yuan and Long Jin (Lanzhou University, P.R. China); Jiliang Zhang (The University of Sheffield, United Kingdom (Great Britain))

Session S-21: Channel Modeling

Conference Room 3, 5th Floor
Thursday, October 24, 16:00 - 17:30
Conference Chairs: Hongliang He (Xi'an Jiaotong University, P.R. China)

Measurement and Modeling of Path Loss and Channel Capacity Analysis for 5G UMa Scenarios

 Ke Zhang, Ruonan Zhang and Jiang Wu (Northwestern Polytechnical University, P.R. China); Yi Jiang (Northwestern Polytechnical University & School of Electronics and Information, P.R. China); Xiao Tang (Northwestern Polytechnical University, P.R. China)

Angular Spread Analysis and Modeling of UAV Air-to-Ground Channels at 3.5 GHz

 Yang Wang, Ruonan Zhang, Bin Li, Xiao Tang and Dawei Wang (Northwestern Polytechnical University, P.R. China)

Space-Time Domain Power Spectrum Measurement and Modeling of UMi O2I Channel at 3.5GHz

 Yi Jiang (Northwestern Polytechnical University & School of Electronics and Information, P.R. China); Song Pan and Ruonan Zhang (Northwestern Polytechnical University, P.R. China); Changyou Li (School of Electronics and Information Northwestern Polytechnical University, P.R. China); Daosen Zhai (Northwestern Polytechnical University, P.R. China)

A 3D Wideband GBSM for THz Communications in Indoor Scenarios

 Yiling Huang and Hengtai Chang (Shandong University, P.R. China); Jie Huang (Southeast University, P.R. China); Wensheng Zhang (Shandong University, P.R. China); Jian Sun (ShanDong University, P.R. China); Cheng-Xiang Wang (Southeast University & Heriot-Watt University, P.R. China)

Low Altitude Air-to-Ground Channel Modelling Based on Measurements in a Suburban Environment

 Kai Tu (Electronics and Information Engineering of Tongji University, P.R. China); José Rodríguez-Piñeiro and Xuefeng Yin (Tongji University, P.R. China); Li Tian (ZTE Corporation, P.R. China)

Doppler Scale Estimation for Underwater Acoustic Communications Using Zadoff-Chu Sequences

 Shuo Jiang, Yiyin Wang and Wenbin Yu (Shanghai Jiao Tong University, P.R. China)

Session S-22: Coding and Modulation I

Conference Room 4, 5th Floor

Thursday, October 24, 16:00 - 17:30

Conference Chairs: Wenchi Cheng (Xidian University, P.R. China)

Performance Evaluation of Autoencoder for Coding and Modulation in Wireless Communications

> Jialong Xu, Wei Chen, Bo Ai, Ruisi He, Yu Jian Li and Jun Hong Wang (Beijing Jiaotong University, P.R. China); Tutun Juhana (Institut Teknologi Bandung, Indonesia); Adit Kurniawan (ITB, Indonesia)

BP List Decoding of Polar Codes with Adaptive Bit Splitting over Critical Set

> Deng Zheng, Kangjian Qin and Zhaoyang Zhang (Zhejiang University, P.R. China)

Content Compression Coding for Federated Learning

> Kaihe Deng, Zhikun Chen and Sihai Zhang (University of Science and Technology of China, P.R. China); Chen Gong (USTC, P.R. China); Jinkang Zhu (University of Science and Technology of China, P.R. China)

A BP-NN Decoding Algorithm for Polar Codes

> Chen Wen (Shanghai Jiao Tong University, P.R. China); Jian Xiong (Shanghai Jiao Tong University, Shanghai, P.R. China); Gui Lin (ShangHai JiaoTong University, P.R. China); Ling Zhang (Shanghai Jiao Tong University, P.R. China)

Near Optimal Decoding of Polar-based Turbo Product Codes

> Meng Ruan, Ming Jiang, Yi Sun, Chunming Zhao and Tao Zou (Southeast University, P.R. China)

Polarized Low Density Parity Check Code on the BSC

> Binbin Gao and Huarui Yin (University of Science and Technology of China, P.R. China); Zhengdao Wang (Iowa State University, USA)

Session S-23: Channel Estimation I

Multimedia Room I, 5th Floor

Thursday, October 24, 16:00 - 17:30

Conference Chairs: Wen-jie Wang (Xi'an Jiaotong University, P.R. China)

Sparse Active User Detection and Channel Estimation Using ADMM in Uplink C-RAN

> Zhenjun Dong, Ronghua Ji and Jian Zhao (Nanjing University, P.R. China)

Millimeter Wave Channel Estimation Based on Clustering Block Sparse Bayesian Learning

> Jiawen Liu, Xiaohui Li, Kun Fang and Tao Fan (Xidian University, P.R. China)

User Grouping Based Structured Joint Sparse Channel Estimation for 3D MIMO System

> Xudong Fang and Wuyang Zhou (University of Science and Technology of China, P.R. China)

2-D Off-grid DOA Estimation for Parallel Coprime Array on Moving Platform

> Fuhong Zeng, Weijian Si and Zhanli Peng (Harbin Engineering University, P.R. China)

Enhanced Interferometer DOA Estimator for Signal with Known Waveform

> Zepeng Hu and Qun Wan (University of Electronic Science and Technology of China, P.R. China)

Underdetermined Direction-of-Arrival Estimation for Wideband Signals Based on SsF Scheme

> Haijing Zhang and Bobin Yao (Chang'an University, P.R. China)

Session S-24: Channel Estimation II

Multimedia Room II, 6th Floor

Thursday, October 24, 16:00 - 17:30

Conference Chairs: Zhenhua Zhou (Shenzhen University, P.R. China)

Channel Estimation for Ambient Backscatter Communications with Large Intelligent Surface

> Hui Zheng, Ziyao Yang, Gongpu Wang, Ruisi He and Bo Ai (Beijing Jiaotong University, P.R. China)

Ultra Wideband Channel Estimation Based on Adaptive Bayesian Compressive Sensing with Weighted Eigen Dictionary

> Lina Qi, Lingling Wang and Zongliang Gan (Nanjing University of Posts and Telecommunications, P.R. China)

Decomposition Estimation for mmWave Channel Based on OMP with Rotation Operation

> Jingyue Huang (Shanghai Jiao Tong University, P.R. China); Hao Wei (Southeast University, P.R. China); Ping Li and Jie Li (ZTE Corporation, P.R. China); Dongming Wang (Southeast University & National Mobile Communications Research Lab., P.R. China)

Optimally Weighted MUSIC Estimator of Common Sinusoidal Poles from Multiple Channels

> Zhenhua Zhou, Shengli Zhang and Hui Wang (Shenzhen University, P.R. China)

Joint Activity Detection and Channel Estimation for Massive Connectivity Network with 1-Bit DAC

> Xi Yang and Shi Jin (Southeast University, P.R. China); Chao-Kai Wen (National Sun Yat-sen University, Taiwan); Xiao Li (Southeast University, P.R. China); Jiang Xue (Xi'an Jiaotong University, P.R. China)

Discriminatory Channel Estimation in MIMO Relay Systems Against Active Eavesdropper

> Xingbo Lu (Army Engineering University of PLA, P.R. China); Weiwei Yang (PLA Army Engineering University, P.R. China); Yueming Cai (Institute of Communications Engineering, PLA Army Engineering University, P.R. China); Xinrong Guan (Army Engineering University of PLA & Postdoctoral Station, Shenzhen Electric Company, P.R. China); Wang Lei (PLA University of Science and Technology, P.R. China)

Friday, October 25

Friday, October 25, 8:30 - 10:00

Session S-25: Blockchain and Emerging Technologies
Conference Room 1, 5th Floor
Friday, October 25, 8:30 - 10:00
Conference Chairs: Ziyi Yang (Beijing Instititue of Technology, P.R. China)

Blockchain Based Secure Package Delivery via Ridesharing

> Xuefei Zhang, Junjie Liu, Yijing Li, Qimei Cui and Xiaofeng Tao (Beijing University of Posts and Telecommunications, P.R. China); Ren Ping Liu (University of Technology Sydney, Australia)

Permissioned Blockchain and Deep Reinforcement Learning for Content Caching in Vehicular Edge Computing and Networks

> Yueyue Dai, Du Xu and Ke Zhang (University of Electronic Science and Technology of China, P.R. China); Sabita Maharjan (Simula Research Laboratory, Norway); Yan Zhang (University of Oslo, Norway)

APRNET: Achieving Privacy-Preserving Real-Name Authentication over Blockchain for Online Services

> Ye Xu and Bin Cao (Harbin Institute of Technology, Shenzhen, P.R. China); Rongxing Lu (University of New Brunswick, Canada); Qinyu Zhang (Shenzhen Graduate School, Harbin Institute of Technology, P.R. China)

Resource Allocation in Blockchain System Based on Mobile Edge Computing Networks

> Longzhe Wu (School of Electronics and Information, Northwestern Polytechnical University, P.R. China); Lixin Li and Xu Li (Northwestern Polytechnical University, P.R. China); Ye Yu (Beijing Institute of Technology, P.R. China); Lei Zhang (University of Glasgow, United Kingdom (Great Britain)); Miao Pan and Zhu Han (University of Houston, USA)

Bitcoin Blockchain Compression Algorithm for Blank Node Synchronization

> Xiaojiao Chen (University of Science and Technology of China, P.R. China); Sian-Jheng Lin (University of Science and Technology of China~(USTC), P.R. China); Nenghai Yu (University of Science and Technology of China, P.R. China)

A Handover Protocol for Device-Free Object Tracking in Large-Scale Environments

> Ziyi Yang (Beijing Instititue of Technology, P.R. China); Heng Liu, Shengxin Xu and Jianping An (Beijing Institute of Technology, P.R. China)

Session S-26: Network Protocols
Conference Room 2, 5th Floor
Friday, October 25, 8:30 - 10:00
Conference Chairs: Xiaoming Yuan (Northeastern University, P.R. China)

An Anti-collision Neighbor Discovery Protocol for Multi-node Discovery

> Mingjin Gao (The Institute of Computing Technology of the Chinese Academy of Sciences, P.R. China); Rujing Shen (The Institute of Computing Technology of the Chinese Academy

of Science, P.R. China); Linhong Mu (the Institute of Computing Technology, Chinese Academy of Science, Beijing, P.R. China); Xinying Liao (the Beijing Information Science and Technology University, Beijing, P.R. China); Jun Li (Nanjing University of Science and Technology, P.R. China); Yiqing Zhou (Chinese Academy of Science, P.R. China)

An IEEE 802.15.6-Based MAC Frame Aggregation Approach for Wireless Body Area Networks

Xiaoming Yuan, Ziyu Ma, Wenjing Li and Haiyang Wang (Northeastern University, P.R. China); Changle Li (Xidian University, P.R. China); Kuan Zhang (University of Nebraska-Lincoln, USA)

Cross-Layer Assisted TCP for Dependable Communications in High-Speed Railway Networks

Jianpeng Xu and Bo Ai (Beijing Jiaotong University, P.R. China); Guowei Shi (University of Testing, P.R. China); Zhangdui Zhong (Beijing Jiaotong University, P.R. China); Selvi Lukman (Bandung Institute of Technology & CV General Teknik, Indonesia); Bagus Juliyanto (Bandung Institute of Technology, Indonesia)

AP Coordination and Full-duplex Enabled Multi-band Operation for the Next Generation WLAN: IEEE 802.11Be (EHT)

Mao Yang and Bo Li (Northwestern Polytechnical University, P.R. China); Zhongjiang Yan (Northwestern Ploytechnical University, P.R. China); Yuan Yan (Northwestern Polytechnical University, P.R. China)

VIMAC: A Vehicular Information Medium Access Control Protocol for High Reliable and Low Latency Transmissions in VANET

Yuanxin Sun, Ruoxin Kuai, Jianquan Wang and Xiaoping Li (University of Electronic Science and Technology of China, P.R. China); WanBin Tang (University of Electronic Science & Technology of China, P.R. China)

GHRP: An Efficient Routing Protocol for Satellite Networks

Hao Han, Yi Zhao and Junyong Wei (University of Chinese Academy of Sciences & Technology and Engineering Center for Space Utilization, P.R. China); Suzhi Cao (Technology and Engineering Center for Space Utilization, P.R. China)

Session S-27: Edge Computing II

Conference Room 3, 5th Floor
Friday, October 25, 8:30 - 10:00
Conference Chairs: Xujie Li (Hohai University, P.R. China)

An Economy-mode Framework for Task Offloading in Fog Computing Networks

Beibei Wang (Hohai University, P.R. China); Fei Shen (Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, P.R. China); Xujie Li (Hohai University, P.R. China); Fei Qin (Chinese Academy of Sciences, P.R. China); Feng Yan (National Mobile Communications Research Laboratory, Southeast University, P.R. China); Siyuan Zhou (Hohai University, P.R. China)

Profit Maximization Task Offloading Mechanism with D2D Collaboration in MEC Networks

Weijie Sun, Haixia Zhang, Leiyu Wang, Shuaishuai Guo and Dongfeng Yuan (Shandong University, P.R. China)

Contract for Joint Communication and Computing in Wireless Caching Systems

ZeXuan Yang, Biling Zhang, Li Wang, Min Yan and Zhiyong Feng (Beijing University of Posts and Telecommunications, P.R. China)

Joint MS Offloading and Interference Coordination for Heterogeneous Ultra Dense Networks

> Di Qu (Chinese Academy of Sciences, P.R. China); Shangwei Xie (Institute of Computing Technology, Chinese Academy of Sciences, P.R. China); Bule Sun (ICT/CAS, P.R. China); Yiqing Zhou (Chinese Academy of Science, P.R. China)

Task Offloading Based on Lyapunov Optimization for MEC-assisted Platooning

> Yuyu Hu, Taiping Cui, Xiaoge Huang and Qianbin Chen (Chongqing University of Posts and Telecommunications, P.R. China)

Reducing Age-of-Information for Computation-Intensive Messages via Packet Replacement

> Jie Gong (Sun Yat-sen University, P.R. China); Qiaobin Kuang (Sun Yat-sen University & School of Electronics and Information Technology, P.R. China); Xiang Chen and Xiao Ma (Sun Yat-sen University, P.R. China)

Session S-28: Satellite Communications I

Conference Room 4, 5th Floor
Friday, October 25, 8:30 - 10:00
Conference Chairs: Hongliang He (Xi'an Jiaotong University, P.R. China)

Performance Analysis of Non-Orthogonal Multiple Access with Co-Channel Interference in a Satellite Communication System

> Silin Xie, Bangning Zhang, Daoxing Guo and Rui Xu (Army Engineering University of PLA, P.R. China); Cheng Li (Army Engineering University of PLA, P.R. China); Wenfeng Ma (Army Engineering University of PLA, P.R. China)

Joint Route Selection and Resource Allocation Algorithm for Data Relay Satellite Systems Based on Energy Efficiency Optimization

> Chen Minglong, Rong Chai and Qianbin Chen (Chongqing University of Posts and Telecommunications, P.R. China)

A New Inter-Satellite Ranging Method Based on Pseudo-Range and Dual-Frequency Carrier Phase

> Bohong Xiang (National Mobile Communications Research Laboratory, Southeast University); Feng Yan (National Mobile Communications Research Laboratory, Southeast University, P.R. China); Yueyue Zhang (Southeast University, P.R. China); Fei Shen (Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, P.R. China); Weiwei Xia and Lianfeng Shen (National Mobile Communications Research Laboratory, Southeast University, P.R. China)

A PAPR-reduction SCMA Codebook Design for Satellite Communication Systems

> Xin Ma (BITTT, P.R. China); Jiayi Zhang (Xidian University, P.R. China); Zhongyang Yu (Xidian University & State Key Laboratory of Integrated Service Networks, P.R. China); Baoming Bai (Xidian University, P.R. China); Qiang Mei (BITTT, P.R. China)

Frequency Offset Estimation for High Dynamic LEO Satellite Communication Systems

> Yaoqi Liu (Institute of Computing Technology, Chinese Academy of Sciences & University of Chinese Academy of Sciences, P.R. China); Yongtao Su (Institute of Computing Technology, Chinese Academy of Sciences, P.R. China); Yiqing Zhou (Chinese Academy of Science, P.R. China); Huan Cao (University of Chinese Academy of Sciences & Institute of Computing Technology, Chinese Academy of Sciences, P.R. China); Jinglin Shi (Institute of Computing Technology, Chinese Academy of Sciences, P.R. China)

Temporal Netgrid Model Based Energy-Efficient Broadcast in Satellite Networks

      Manqing Zhang and Donghui Liu (University of Science and Technology of China, P.R. China); Weilong Ren (CETC38 China Electronic Technology Group Corporation, P.R. China); Wuyang Zhou (University of Science and Technology of China, P.R. China)

Session S-29: End-to-End Service Provisioning

Conference Room 5, 5th Floor

Friday, October 25, 8:30 - 10:00

Conference Chairs: Yuan Jiang (Sun Yat-sen University, P.R. China)

End-to-End Classification of Radar Target Under Low SNR via Two-stream Fusion Network

      Jiayin Xue (Harbin Institute of Technology (Shenzhen), P.R. China); Fanyang Meng and Rongxiang He (Pengcheng Laboratory, P.R. China); Qinyu Zhang (Shenzhen Graduate School, Harbin Institute of Technology, P.R. China)

E2E Delay Optimization for Smart Grids Mission-critical Slices in Core Networks

      Delong Yang and Sachula Meng (China Electric Power Research Institute Co., Ltd., Beijing, P.R. China); Zhihui Wang (China Electric Power Research Institute Co., Ltd., P.R. China); Sai Wu (China Electric Power Research Institute, P.R. China); Xuan Li (China Electric Power Research Institute Co., Ltd., P.R. China); Xinzhi Cao and Xiaoyun Liu (Information & Telecommunications State Grid ShanDong Electric Power Co., P.R. China); Xue Wang and Yuanbin Chen (Beijing University of Posts and Telecommunications, P.R. China)

End-to-End Delay Minimization-based Joint Rule Caching and Flow Forwarding Algorithm for SDN

      Qiongfang Yuan, Rong Chai and Qianbin Chen (Chongqing University of Posts and Telecommunications, P.R. China)

SDR Implementation of an End-to-End mmWave Testbed Based on Phased Antenna Array

      Kang Wang (National Mobile Communications Research Laboratory, Southeast University, P.R. China); Xi Yang and Xiao Li (Southeast University, P.R. China); Chao-Kai Wen (National Sun Yat-sen University, Taiwan); Shi Jin (Southeast University, P.R. China)

Overfitting and Underfitting Analysis for Deep Learning Based End-to-end Communication Systems

      Haotian Zhang, Lin Zhang and Yuan Jiang (Sun Yat-sen University, P.R. China)

Joint Caching and Trajectory Design for Cache-Enabled UAV in Vehicular Networks

      Huaqing Wu (University of Waterloo, Canada); Jiayin Chen (University of Waterloo, Waterloo, Canada); Feng Lyu (University of Waterloo, Canada); Li Wang (Beijing University of Posts and Telecommunications, P.R. China); Sherman Shen (University of Waterloo, Canada)

Session S-30: UAV Networks I

Multimedia Room I, 5th Floor

Friday, October 25, 8:30 - 10:00

Conference Chairs: Xiaoyan Zhu (Xidian University, P.R. China)

Intelligent Decision-Making for 3-Dimensional Dynamic Obstacle Avoidance of UAV Based on Deep Reinforcement Learning

Xiao Han, Jing Wang and Jiayin Xue (Harbin Institute of Technology (Shenzhen), P.R. China); Qinyu Zhang (Shenzhen Graduate School, Harbin Institute of Technology, P.R. China)

Deployment Optimization of Multiple UAVs in Multi-UAV Assisted Cellular Networks

Xuan Yang and Zipeng Li (Huazhong University of Science and Technology, P.R. China); Xiaohu Ge (Huazhong University of Science & Technology, P.R. China)

A UAV Real-time Trajectory Optimized Strategy for Moving Users

Gengxin Li, Chen Zhuang and Qi Wang (University of Science and Technology of China, P.R. China); Yitao Li (USTC, P.R. China); Xiaoshen Xu (Unit 32039 of PLA, P.R. China); Wuyang Zhou (University of Science and Technology of China, P.R. China)

Deep RL-based Trajectory Planning for AoI Minimization in UAV-assisted IoT

Conghao Zhou (University of Waterloo, Canada); Hongli He (Zhejiang University, P.R. China); Peng Yang, Feng Lyu, Wen Wu, Nan Cheng and Sherman Shen (University of Waterloo, Canada)

Trajectory and Beamforming Vector Optimization for Multi-UAV Multicast Network

Chengcheng Feng and Chao Zhang (Xi'an Jiaotong University, P.R. China); Xinmin Luo (School of Electronics and Information Engineering, Xi'an Jiaotong University, P.R. China)

An Anti-Collision Algorithm Based on UAV for Internet of Things

Yixin He and Ruonan Zhang (Northwestern Polytechnical University, P.R. China); Yi Jiang (Northwestern Polytechnical University & School of Electronics and Information, P.R. China); Bin LI (Northwest Polytechnical University, P.R. China); Dawei Wang (Northwestern Polytechnical University, P.R. China)

Session S-31: UAV Networks II

Multimedia Room II, 6th Floor

Friday, October 25, 8:30 - 10:00

Conference Chairs: Jue Liu (PLA Army Engineering University, P.R. China)

Resource Allocation for UAVs-Enabled Mobile Social Networks

Yan Xia, Zhou Su, Qichao Xu, Minghui Dai and Weiwei Chen (Shanghai University, P.R. China)

Beam-Steering Optimization in Multi-UAVs mmWave Networks: A Mean Field Game Approach

Qianqian Cheng, Lixin Li, Kaiyuan Xue, Huan Ren and Xu Li (Northwestern Polytechnical University, P.R. China); Wei Chen (Tsinghua University, P.R. China); Zhu Han (University of Houston, USA)

Energy Minimization in UAV-Aided Wireless Sensor Networks with OFDMA

Sheng Xue, Suzhi Bi and Xiaohui Lin (Shenzhen University, P.R. China)

Implementation for UAVs Aided Edge Sensing System in Wireless Emergency Communications

Pengju Xiao, Li Wang, Jianbin Chuan, Xuefu Wang, Jian Kuang and Aiguo Fei (Beijing University of Posts and Telecommunications, P.R. China)

Q-Learning Based UAV Secure Communication in Presence of Multiple UAV Active Eavesdroppers

Jue Liu and Weiwei Yang (PLA Army Engineering University, P.R. China); Shi Ming Xu (PLA University of Science and Technology, P.R. China); Jun Liu (Jinshen College, P.R. China); Qianqian Zhang (Jinshen College, P.R.China)

Resource Allocation for Multiuser Video Streaming in UAV Relay Networks

Hangjing Zhang, Yang Hu and Yan Chen (University of Electronic Science and Technology of China, P.R. China)

Friday, October 25, 10:30 - 12:00

Session S-32: Vehicular Communications I

Conference Room 1, 5th Floor

Friday, October 25, 10:30 - 12:00

Conference Chairs: Jing Xu (Xi'an Jiaotong University, P.R. China)

Energy Minimization for Infrastructure-to-Vehicle Communications with Multiple Roadside Units

> Qing Wei, Li Wang and Aiguo Fei (Beijing University of Posts and Telecommunications, P.R. China)

Proactive Caching in Auto Driving Scene via Deep Reinforcement Learning

> Zihui Zhu (School of Information Science and Engineering, Southeast University, P.R. China); Zhengming Zhang, Wen Yan, Yongming Huang and Luxi Yang (Southeast University, P.R. China)

Fog-Enabled Cooperative Offloading for Intermittently Connected Vehicular Networks

> Yan Chen, Fan Wu, Lixiang Ma and Supeng Leng (University of Electronic Science and Technology of China, P.R. China)

Mobile Traffic Prediction Based on Densely Connected CNN for Cellular Networks in Highway Scenarios

> Dongtian Liang, Jiaxin Zhang and Shuai Jiang (Beijing University of Posts and Telecommunications, P.R. China); Xing Zhang (BUPT, P.R. China); Jie Wu and Qi Sun (China Mobile Research Institute, P.R. China)

Energy-Efficient Resource Allocation in Heterogeneous Vehicular Networks

> Xiaoge Huang, Chenbin Lai, Ke Xu and Qianbin Chen (Chongqing University of Posts and Telecommunications, P.R. China)

Vehicle to Infrastructure Channel Measurement and Beamforming Analysis of RMa Scenario

> Haochen Xu (Northwestern Polytechnical University, P.R. China); Yi Jiang (Northwestern Polytechnical University & School of Electronics and Information, P.R. China); Ruonan Zhang (Northwestern Polytechnical University, P.R. China); Changyou Li (School of Electronics and Information Northwestern Polytechnical University, P.R. China); Bin Li (Northwestern Polytechnical University, P.R. China)

Session S-33: Performance Analysis and Optimization II

Conference Room 2, 5th Floor

Friday, October 25, 10:30 - 12:00

Conference Chairs: Jianbo Du (Xi'an University of Posts & Telecommunications, P.R. China)

Robust Energy Efficiency Optimization for SWIPT-enabled Heterogeneous NOMA Networks

> Gongguo Zhang (Chongqing University of Posts and Telecommunications, P.R. China); Cuixian Wu (Chongqing University of Posts and Telecommunications, USA); Yongjun Xu and Zhengqiang Wang (Chongqing University of Posts and Telecommunications, P.R. China)

Outage Analysis of AF-based Mixed Beaulieu-Xie and Gamma-Gamma Transmission Systems

Zaichen Zhang (National Mobile Communications Research Laboratory, Southeast University, P.R. China); Jiashun Hu and Liang Wu (Southeast University, P.R. China); Jian Dang (Southeast University & National Mobile Communications Research Laboratory, P.R. China); Guanghao Zhu (Nanjing University, P.R. China)

Low Complexity Iterative Combining-Equalization Algorithm Based on SIC

Mei Gao, Zhongwei Liu, Feng Jing and Haodan Ran (National University of Defense Technology, P.R. China); Shuyin Zhang (Xi'an Flight Academy of Air Force, P.R. China)

Latency Performance Analysis of Predictive Resource Allocation

Yuanxin Sun, Ruoxin Kuai and Xiaoping Li (University of Electronic Science and Technology of China, P.R. China); WanBin Tang (University of Electronic Science & Technology of China, P.R. China)

Deep Learning Based Customer Churn Analysis

Yuxing Chen, Wei Liu, Shulin Cao and Xiaoyan Zhu (Xidian University, P.R. China)

Capacity and Rate Maximization in MEC Systems

Jianbo Du (Xi'an University of Posts & Telecommunications, P.R. China); Guangyue Lu (Xi'an University of Posts & Telecommunications, P.R. China); Jing Jiang and Qiong Zhao (Xi'an University of Posts and Telecommunications, P.R. China)

Session S-34: Optical Communications II

Conference Room 3, 5th Floor
Friday, October 25, 10:30 - 12:00
Conference Chairs: Wenchi Cheng (Xidian University, P.R. China)

Symbol-level Precoding for Multiuser Visible Light Communication

Xiaoting Ma, Xianqing Jin, Jiajun Deng and Meiyu Jin (University of Science and Technology of China, P.R. China); Chen Gong (USTC, P.R. China); Zhengyuan Xu (University of Science and Technology of China, P.R. China)

Secrecy Outage Probability Analysis for Visible Light Communications with SWIPT and Random Terminals

Yu Qiu (Southeast University, P.R. China); Jin-Yuan Wang (Nanjing University of Posts and Telecommunications, P.R. China); Sheng-Hong Lin (Nanjing Institute of Mechatronic Technology, P.R. China); Jun-Bo Wang (Southeast University, P.R. China); Min Lin (Nanjing University of Posts and Telecommunications, P.R. China)

Mitigation of Strong Background Radiation with Attenuation Diversity for Vehicular Visible Light Communication

Chengpeng Tu, Weijie Liu and Zhengyuan Xu (University of Science and Technology of China, P.R. China)

Internet of Vehicle System Based on Automotive Headlight Utilizing Probabilistic Shaping

Chaofan Wang, Peng Zou, Jiang Chen, Guoqiang Li and Nan Chi (Fudan University, P.R. China)

Investigation of Convolution Neural Network-based Wavefront Correction for FSO Systems

Minan Chen, Xianqing Jin and Zhengyuan Xu (University of Science and Technology of China, P.R. China)

High Reliable Orbital Angular Momentum Wireless Communications for Space Information Networks

Lyu Runyu and Wenchi Cheng (Xidian University, P.R. China); Wei Zhang (University of New South Wales, Australia); Hailin Zhang (Xidian University, P.R. China)

Session S-35: Performance Analysis and Optimization I

Conference Room 4, 5th Floor

Friday, October 25, 10:30 - 12:00

Conference Chairs: Dongyang Xu (Xi'an Jiaotong University, P.R. China)

Low-complexity and Robust Detection for Hybrid Chaos Communication

Ang Zhou (National University of Defense Technology, P.R. China); Shilian Wang (National University of Defence Technology, P.R. China); Fanggang Wang (Beijing Jiaotong University, P.R. China)

Reduced Complexity Interference Cancellation for OFDM Systems with Insufficient Cyclic Prefix

Shi Wei (Southeast University, P.R. China); Chunming Zhao (National Mobile Communications Research Laboratory, Southeast University, P.R. China); Ming Jiang (Southeast University, P.R. China)

Cell Coverage Analysis for High-speed Railway Communication Systems with Hard Handoff

Sheng-Hong Lin (Nanjing Institute of Mechatronic Technology, P.R. China); Youyun Xu (Nanjing University of Posts and Telecommunications & Shanghai Jioatong University, P.R. China); Jin-Yuan Wang (Nanjing University of Posts and Telecommunications, P.R. China)

Performance Analysis for D2D-Enabled Cellular Networks with Mobile Edge Computing

Zong Peng Fei, Han Hu, Hong Wang and Hongbo Zhu (Nanjing University of Posts and Telecommunications, P.R. China)

Performance Analysis of Superposition Modulation in Physical Layer Security

Shubo Sun, Na Li, Haowei Wang and Xiaofeng Tao (Beijing University of Posts and Telecommunications, P.R. China)

Joint Time-Frequency Diversity Based Uplink Grant-Free Transmission Scheme for URLLC

Shuyu Zhao, Yichen Wang, Yuncong Xie and Dongyang Xu (Xi'an Jiaotong University, P.R. China)

Session S-36: D2D Communications

Conference Room 5, 5th Floor

Friday, October 25, 10:30 - 12:00

Conference Chairs: Yukai Liu (Shanghai Jiao Tong University, P.R. China)

SCMA Receiver Design for Cellular Uplink Transmission Coexisted with D2D

Yukai Liu, Wen Chen and Fan Wei (Shanghai Jiao Tong University, P.R. China); Fabrice Labeau (McGill University, Canada)

A Convolutional Neural Network Based Resource Management Algorithm for NOMA Enhanced D2D and Cellular Hybrid Networks

Zhenfeng Zhang, Daosen Zhai, Ruonan Zhang, Xiao Tang and Yutong Wang (Northwestern Polytechnical University, P.R. China)

Matching Based Two-Timescale Resource Allocation for Cooperative D2D Communication

Yiling Yuan and Tao Yang (Fudan University, P.R. China); Yulin Hu (RWTH Aachen University, Germany); Hui Feng (Fudan University, P.R. China); Bo Hu (Fudan University, Shanghai, P.R. China)

Covert Communication with Power Uncertainty for D2D Content Sharing

> Cheng Wan (Army Engineering University of PLA, P.R. China); Dan Wu (Institute of Communications Engineering, PLAUST, P.R. China); Meng Wang and Xin Shi (Army Engineering University of PLA, P.R. China); Xinrong Guan (Army Engineering University of PLA & Postdoctoral Station, Shenzhen Electric Company, P.R. China)

Power-Spectrum Trading for Full-Duplex D2D Communications

> Xiaoli Huang and Daquan Feng (Shenzhen University, P.R. China); Sa Xiao (University of Electronic Science and Technology of China, P.R. China); Chunlong He (Shenzhen University, P.R. China)

Successive Cancellation List Decoder with Adaptive List Length

> Jiajie Tang and Ming Chen (Southeast University, P.R. China)

Session S-37: Internet of Things I

Multimedia Room I, 5th Floor
Friday, October 25, 10:30 - 12:00
Conference Chairs: Hao Xu (Technical University of Berlin, Germany)

Robust Design for Massive Access in B5G Cellular Internet of Things

> Feiyan Tian, Xiaoming Chen and Zhaoyang Zhang (Zhejiang University, P.R. China)

Low-Complexity Beamspace Massive Access for B5G Cellular Internet of Things

> Rundong Jia and Xiaoming Chen (Zhejiang University, P.R. China); Qiao Qi (ZheJiang University, P.R. China)

Resource Allocation for UAV-Assisted IoT Networks with Energy Harvesting and Computation Offloading

> Hao Xu (Technical University of Berlin, Germany); Cunhua Pan (Queen Mary University of London, United Kingdom (Great Britain)); Kezhi Wang (Northumbria University, United Kingdom (Great Britain)); Ming Chen (Southeast University, P.R. China); Arumugam Nallanathan (Queen Mary University of London, United Kingdom (Great Britain))

Design and Optimization of Physical Layer Security Transmission Scheme in Random Cognitive Internet of Things

> Zeyuan Zhu, Baoquan Yu and Xiaojing Chu (Army Engineering University of PLA, P.R. China); Yueming Cai (Institute of Communications Engineering, PLA Army Engineering University, P.R. China)

Integration Application of 5G and Smart Grid

> Sachula Meng (China Electric Power Research Institute Co., Ltd., Beijing, P.R. China); Zhihui Wang (China Electric Power Research Institute Co., Ltd., P.R. China); Mingwei Tang (Beijing University of Posts and Telecommunications, P.R. China); Sai Wu (China Electric Power Research Institute, P.R. China); Xuan Li (China Electric Power Research Institute Co., Ltd., P.R. China)

Multi-band Digital Predistortion in IoT System with Co-prime Sampling Technique

> Ting Liu, Xin Hu, Zhijun Liu, Yuchen Zhang and Xiuhua Li (Beijing University of Posts and Telecommunications, P.R. China); Weidong Wang (Beijing Unversity of Posts and Telecommunications, P.R. China)

Session S-38: Internet of Things II

Multimedia Room II, 6th Floor

Friday, October 25, 10:30 - 12:00

Conference Chairs: Xiaoyan Zhu (Xidian University, P.R. China)

Differentially Privacy-preserving Social IoT

Linjie Zhang, Xiaoyan Zhu, Xuexue Han and Jianfeng Ma (Xidian University, P.R. China)

Neural Network Based Prediction and Analysis for NB-IoT Network Location

Zhenghao Yi, Junhui Zhao, Ziyang Zhang and Ming Kong (Beijing Jiaotong University, P.R. China)

Reinforcement Learning Based Congestion Control in Satellite Internet of Things

Zhou Wang and Jiaxin Zhang (Beijing University of Posts and Telecommunications, P.R. China); Xing Zhang (BUPT, P.R. China); Wenbo Wang (Beijing University of Posts and Telecommunications, P.R. China)

Deep Reinforcement Learning for Dynamic Access Control with Battery Prediction for Mobile-Edge Computing in Green IoT Networks

Lijuan Xu (Xidian University, P.R. China); Meng Qin (School of Electronics and Computer Engineering, Peking University, P.R. China); Qinghai Yang (Xidian University, P.R. China); Kyung Sup Kwak (Inha University, Korea)

Joint Node Assignment and Trajectory Optimization for Rechargeable Multi-UAV Aided IoT Systems

Li Xiaowei (Beijing University of Technology, P.R. China); Haipeng Yao (Beijing University of Posts and Telecommunications, P.R. China); Jingjing Wang (Tsinghua University, Beijing, P.R. China); Yunjie Liu (Beijing University of Posts and Telecommunications, P.R. China)

High-Efficient Ranging Algorithms for Wireless Sensor Network

Zijian Zhang, Hanying Zhao and Yuan Shen (Tsinghua University, P.R. China)

Friday, October 25, 14:00 - 15:30

Session S-39: Localization Systems I
Conference Room 1, 5th Floor
Friday, October 25, 14:00 - 15:30
Conference Chairs: Kun Zhao (East China Normal University, P.R. China)

RTIL: A Real-Time Indoor Localization System by Using Angle of Arrival of Commodity WiFi Signal
Zengshan Tian, Zhongchun Wang, Ze Li and Mu Zhou (Chongqing University of Posts and Telecommunications, P.R. China)

Application of Differential Time Synchronization in Indoor Positioning
Tiantian Zhao, Kun Zhao, Chao Yu and Danan Dong (East China Normal University, P.R. China); Zheng Qi Zheng (East China Normal Unviersity, P.R. China); Yu Zhang (Shanghai Institute of Technology, P.R. China)

Not Only Communication: Co-band Signals Used in 5G MIMO System for Indoor Positioning
Yun Liu and Ke Han (Beijing University of Post and Telecommunication, P.R. China); Zhongliang Deng (Beijing University of Posts and Telecommunications, P.R. China); Lingjie Shi, Jiawei Fu and Yunfei Xu (Beijing University of Post and Telecommunication, P.R. China)

Improved Indoor Positioning Algorithm Using KPCA and ELM
Lijun Lian and Shaobo Xia (Shandong TV University, P.R. China); Qiong Wu (Jiangnan University, P.R. China); Sen Zhang (University of Science and Technology Beijing, P.R. China); Changqiang Jing (LinYi University, P.R. China)

Age-optimal IR-HARQ Design in the Presence of Non-Trivial Propagation Delay
Ying Wang (Harbin Institute of Technology (Shenzhen), P.R. China); Shaohua Wu (Harbin Institute of Technology, P.R. China); Dongqing Li (Harbin Institute of Technology (Shenzhen), P.R. China); Jian Jiao (Harbin Institute of Technology - Shenzhen, P.R. China); Qinyu Zhang (Shenzhen Graduate School, Harbin Institute of Technology, P.R. China)

Ultra-broadband Polarization Rotator Design in Terahertz Region
Weijun Hong, Xinlong Li, Jianfeng Zhu and Shufang Li (Beijing University of Posts and Telecommunications, P.R. China); Tingxiao Cai (China Electronics Standardization Institute, P.R. China); Huanhuan Lin (Borsche Technologies Limited Company, P.R. China); Hongjie Liu (Beijing Borsche Technologies Co. Ltd, P.R. China); Yanqing Wei (Renmin University of China, P.R. China)

Session S-40: User Behaviors and Security in Networks
Conference Room 2, 5th Floor
Friday, October 25, 14:00 - 15:30
Conference Chairs: Yinghao Ge (Xi'an Jiaotong University, P.R. China)

Optimal EV Charging Network Design: When Users Have Choices
Yuchen Chen, Zhida Qin and Xiaoying Gan (Shanghai Jiao Tong University, P.R. China)

A User Behavior Aware Immersive Video Caching Algorithm
Yunpeng Song, Yongxiang Zhao and Chunxi Li (Beijing Jiaotong University, P.R. China)

MADAFE: Malicious Account Detection on Twitter with Automated Feature Extraction

Hao Yue and Lijie Zhou (San Francisco State University, USA); Kaiping Xue (University of Science and Technology of China, P.R. China); Hongning Li (Xidian University, P.R. China)

A Novel User Membership Leakage Attack in Collaborative Deep Learning

Yaoru Mao, Xiaoyan Zhu, Wenbin Zheng, Danni Yuan and Jianfeng Ma (Xidian University, P.R. China)

Channel State Information Based Optimal Strategy for Covert Communication

Jianquan Wang and Yuan Li (University of Electronic Science and Technology of China, P.R. China); WanBin Tang (University of Electronic Science & Technology of China, P.R. China); Xiaoping Li and Shaoqian Li (University of Electronic Science and Technology of China, P.R. China)

Deep Learning and Social Relationship Based Cooperative Caching Strategy for D2D Communications

Lingyu Ma, Haixia Zhang, Tiantian Li and Dongfeng Yuan (Shandong University, P.R. China)

Session S-41: Localization Systems II

Conference Room 3, 5th Floor
Friday, October 25, 14:00 - 15:30
Conference Chairs: Jing Xu (Xi'an Jiaotong University, P.R. China)

Exploiting RSS Submitting Behavior for Abnormal Crowd Traffic Detection in Indoor Positioning System

Weiwei Li and Zhou Su (Shanghai University, P.R. China)

Research on Localization Algorithm of Wireless Sensor Networks Based on IoT

Yang Jing, Hongxu Tao and Yun Lin (Harbin Engineering University, P.R. China)

Trajectory-Curvature-Aware Moving Jammer Positioning for UAV Networks

Yanbin Gong, Wenjun Xu, Li Guo and Zhi Zhang (Beijing University of Posts and Telecommunications, P.R. China); Ping Zhang (WTI-BUPT, P.R. China)

Deriving AP Position and Antenna Array Orientation for Wi-Fi Localization

Ziqian Chen, Xinyu Tong and Xiaohua Tian (Shanghai Jiao Tong University, P.R. China)

A TDOA-FDOA Localization Method in Closed-form Based on Deviation Refining

Fengrui Zhang (University of Electronic Science and Technology of China, P.R. China); Mingbing Li (Southwest Institute of Electronic Technology, P.R. China); Yimao Sun, Jifeng Zou and Qun Wan (University of Electronic Science and Technology of China, P.R. China)

A Fast Single-Site Fingerprint Localization Method in Massive MIMO System

Lin Liu, Xiaojun Wang and Yan Lin (Southeast University, P.R. China); Xiaoshu Chen (University of Southeast, P.R. China)

Session S-42: Network Optimization I

Conference Room 4, 5th Floor
Friday, October 25, 14:00 - 15:30
Conference Chairs: Chungang Yang (Xidian University, P.R. China)

Similar User Assisted Mobility Prediction

Lu Liu, Junyao Guo, Sihai Zhang and Jinkang Zhu (University of Science and Technology of China, P.R. China)

Integrated Resource Scheduling for User Experience Enhancement: A Heuristically Accelerated DRL

  Lingxia Wang, Chungang Yang, Xinwei Wang and Jiandong Li (Xidian University, P.R. China); Yan Wang (Huawei Technologies Co., Ltd., P.R. China); Yuanyuan Wang (Shanghai Huawei Technologies CO., LTD., P.R. China)

Mobile User Capacity Analysis of LTE-A Systems Based on Field Measurement Data

  Jong Seob Song and Hu Jin (Hanyang University, Korea); Hyeyeon Kwon (ETRI, Korea); Seung Keun Park (Electronics and Telecommunications Research Institute, Korea)

Study of a Traffic Model Based on Adaptive Chaotic Mapping for mMTC Services

  Qi Hao, Yan Shi and Qiang Zheng (Xidian University, P.R. China)

A Multi-source Based Coupled Tensors Completion Algorithm for Incomplete Traffic Data Imputation

  Weiming Zhou, Haifeng Zheng, Xinxin Feng and Dong Lin (Fuzhou University, P.R. China)

Joint Dynamic User Pairing, Computation Offloading and Power Control for NOMA-based MEC System

  Jingui Li, Fan Wu, Ke Zhang and Supeng Leng (University of Electronic Science and Technology of China, P.R. China)

Session S-43: Information Security I

Multimedia Room I, 5th Floor
Friday, October 25, 14:00 - 15:30
Conference Chairs: Dongyang Xu (Xi'an Jiaotong University, P.R. China)

Privacy-Protected Certificateless Aggregate Signature Scheme in VANET

  Nan Zhao (Nantong University, P.R. China); Guo-An Zhang (Electronic and Information School, Nantong University, Jiang-Su province, P.R. China)

Physical Layer Secrecy in the Wireless Power Transfer Network with Full-Duplex Jamming

  Chong Huang and Gaojie Chen (University of Leicester, United Kingdom (Great Britain)); Yu Gong (Loughborough University, United Kingdom (Great Britain)); Jie Tang (South China University of Technology, P.R. China); Jonathon Chambers (University of Leicester, United Kingdom (Great Britain))

Achieve Secure and Efficient Skyline Computation for Worker Selection in Mobile Crowdsensing

  Xichen Zhang and Rongxing Lu (University of New Brunswick, Canada); Jun Shao (Zhejiang Gongshang University, P.R. China); Hui Zhu (Xidian University, P.R. China); Ali A. Ghorbani (University of New Brunswick, Canada)

Secure Transmission Strategy for Intelligent Reflecting Surface Enhanced Wireless System

  Biqian Feng (University of Shanghai Jiao Tong, P.R. China); Yongpeng Wu (Shanghai Jiao Tong University, P.R. China); Mengfan Zheng (Imperial College London, United Kingdom (Great Britain))

Research on Attacks Detection in CSMA Wireless Networks

  Fang Fang (Army Engineering University of PLA, P.R. China); Li Yonggui (Nanjing Telecommunication Technology Institute, P.R. China); Yingtao Niu (National University of Defense Technology, P.R. China); Yutao Wang and Chen Han (Army Engineering University of PLA, P.R. China)

Anomaly-Based Network Intrusion Detection Using SVM

Yuan Zhang (Xidian University (XD), P.R. China); Qinghai Yang (Xidian University, P.R. China); Sangarapillai Lambotharan, Konstantinos Kyriakopoulos and Ibrahim Ghafir (Loughborough University, United Kingdom (Great Britain)); Basil AsSadhan (King Saud University, Saudi Arabia)

Session S-44: Information Security II
Multimedia Room II, 6th Floor
Friday, October 25, 14:00 - 15:30
Conference Chairs: Yingtao Niu (National University of Defense Technology, P.R. China)

Pilot Spoofing Attack Detection and Downlink Precoding in Massive MIMO Systems

Wei Wang (Nanjing University of Aeronautics and Astronautics, P.R. China); Zhisheng Yin, Feng Lyu and Huaqing Wu (University of Waterloo, Canada); Qihui Wu (Nanjing University of Aeronautics and Astronautics, P.R. China); Sherman Shen (University of Waterloo, Canada)

Cooperative Jamming in Downlink Cellular Networks with Available Eavesdroppers' Location Information

Lei Wu (Beijing Information Science and Technology University, P.R. China); Yuanyuan Gao, Shijie Wang, Sheng Huang and Xiaoyu Wang (Army Engineering University of PLA, P.R. China); Nan Sha (University of Army Engineering of PLA, P.R. China)

Interference and Energy Management for Dense Aerial Access Networks: A Mean Field Game Approach

Mbazingwa Mkiramweni (Xidian, P.R. China); Chungang Yang and Jiandong Li (Xidian University, P.R. China); Lixin Li (Northwestern Polytechnical University, P.R. China); Zhu Han (University of Houston, USA)

A Calculation Method of Multi-Domain Anti-Interference Processing Gain for Wireless Communication System

Yingtao Niu, Cheng Li and Yan Liu (National University of Defense Technology, P.R. China)

A Directional Reactive Jamming Scheme Based on Machine Learning

Runhua Li (Xi'an Jiaotong University, P.R. China); Qihong Duan (Xi'an Jiaotong University, P.R. China); Jiang Xue (Xi'an Jiaotong University, P.R. China); Shun Zhang (Xidian University, P.R. China); Chen He (Northwest University, P.R. China & University of British Columbia, Canada)

A Three-Stage Stackelberg Game for Secure Communication with a Wireless Powered Jammer

Qun Li and Ding Xu (Nanjing University of Posts and Telecommunications, P.R. China)

Friday, October 25, 16:00 - 17:30

Session S-45: Precoding Technologies I

Conference Room 1, 5th Floor

Friday, October 25, 16:00 - 17:30

Conference Chairs: Yimeng Feng (Fudan University, P.R. China)

Two-dimensional Hybrid Precoding with Limited Feedback for 3-D Massive MIMO

Kaide Zhao (Nanjing University of Posts and Telecommunications & College of Telecommunication and Information Engineering, P.R. China); Ting Li and Fei Li (Nanjing University of Posts and Telecommunications, P.R. China)

Joint Precoding Using Successive Over-relaxation Matrix Inversion and Newton Iteration for Massive MIMO Systems

Yimeng Bai, Zhonghua Liang, Chenhui Zhai, Yue Xin and Wei Li (Chang'an University, P.R. China)

A Low-Complexity Precoding Algorithm Based on Improved SOR Method for Massive MIMO Systems

Donghui Liu and Wuyang Zhou (University of Science and Technology of China, P.R. China)

Hybrid Precoding for Massive MIMO Systems Using Partially-Connected Phase Shifter Network

Yimeng Feng and Yi Jiang (Fudan University, P.R. China)

Eigen Decomposition-Based Hybrid Precoding for Millimeter Wave MIMO Systems with Low-Resolution ADCs/DACs

Xu Qiao, Yao Zhang, Meng Zhou, Haotong Cao and Longxiang Yang (Nanjing University of Posts and Telecommunications, P.R. China)

Arificial-Noise Aided Precoding Design for MIMO Integrated Radar and Communication Systems

Yifan Zhou and Hui-lin Zhou (Nanchang University, P.R. China); Fuhui Zhou (Utah State University, USA); Shuai Ma (China University of Mining and Technology, P.R. China); Rose Qingyang Hu (Utah State University, USA)

Session S-46: Signal Estimation and Detection I

Conference Room 2, 5th Floor

Friday, October 25, 16:00 - 17:30

Conference Chairs: Ting Liu (Southeast University, P.R. China)

Data Recovery from Sub-Nyquist Sampled Signals: Fundamental Limit and Detection Algorithm

Xiqian Luo and Zhaoyang Zhang (Zhejiang University, P.R. China)

A Novel Phase Noise Mitigation Method for Full-Duplex Transceivers

Xin Quan (Southwest Jiaotong University, P.R. China); Ying Liu (University of Electronic Science and Technology of China, P.R. China); Pingzhi Fan (Southwest Jiaotong Universityiversity, P.R. China); Youxi Tang (University of Electronic Science and Technology of China, P.R. China)

Coherent Estimation of Range Difference and Range Rate Difference for Unknown Frequency Hopping Signals

Zhixin Liu (PLA Strategic Support Force Information Engineering University, P.R. China); Dexiu Hu (Tsinghua University & Zhengzhou Institute of Information Science and

Technology, P.R. China); Yongjun Zhao (Zhengzhou Institute of Information Science and Technology, P.R. China); Yongsheng Zhao (PLA Strategic Support Force Information Engineering University, P.R. China); Rui Wang (Institute of Surveying and Mapping, Information Engineering University, P.R. China); Hongzhi Jiang (ZhengZhou Information Technology Institute, P.R. China)

Signal Distribution Oriented Mean Functions in GPR Based Fingerprint Augment

Xianmin Wang, Tian Lan, Sihai Zhang and Jinkang Zhu (University of Science and Technology of China, P.R. China)

A Data-aided Compensation of Clipped OFDM Signals by Bayesian Learning Scheme

Ting Liu and Shi Jin (Southeast University, P.R. China); Chao-Kai Wen (National Sun Yat-sen University, Taiwan); Xiaohu You (National Mobile communication Research Lab., Southeast University, P.R. China)

FP-based Hybrid Precoding with Dynamic Subarrays and Low-resolution PSs

Hongyu Li, Rang Liu, Ming Li and Qian Liu (Dalian University of Technology, P.R. China)

Session S-47: Future Network in Mining Industry

Conference Room 3, 5th Floor
Friday, October 25, 16:00 - 17:30
Conference Chairs: Duan Zhao (China University of Mining and Technology, P.R. China)

Foreign Body Recognition for Coal Mine Conveyor Based on Improved PCANet

Xiao Li (China University of Mining and Technology, P.R. China)

On the Energy-efficient Scheduling for Coal Mine Heterogeneous Computing System

Liang Tan (Beijing University of Posts and Telecommunications, P.R. China); Chaowei Wang (Beijing University of Posts and Telecommunications & Schoole of Electronics Engineering, P.R. China); Weidong Wang (Beijing Unversity of Posts and Telecommunications, P.R. China)

Dynamic Preamble Grouping and Access Control Scheme in Machine-to-Machine Communication

Xiaoyan Zhao and Cheng Wang (Beijing University of Posts and Telecommunications, P.R. China); Weidong Wang (Beijing Unversity of Posts and Telecommunications, P.R. China)

Guaranteed Greedy Scheduling Algorithm for Coal Workface PWSN

Zuhao Fang (China University of Mining and Technology, P.R. China)

An Anomaly Detection Data Recognition Algorithm of Portable Gas Sensor for Calibration in Mine IoT Based on Sliding Time Window

Wang Gang (National Joint Engineering Laboratory of Internet Applied Technology of Mines, P.R. China)

A Study on Noise Reduction and Automatic P-phase Onset Time Picking Technology of Weak Micro-Seismic Signals from Underground Mines

Rui Dai (BGRIMM Technology Group, P.R. China); Da Zhang (Beijing General Research Institute of Mining and Metallurgy, P.R. China); Hu Ji (BGRIMM Technology Group, P.R. China); Yaqian Shi (Beijing General Research Institute of Mining and Metallurgy Technolgy Group, P.R. China)

Session S-48: Signal Estimation and Detection II

Conference Room 4, 5th Floor

Friday, October 25, 16:00 - 17:30

Conference Chairs: Junquan Deng (National University of Defense Technology, P.R. China)

A Variable Symbol Duration Based FTN Signaling Scheme for PLS

> Yuan Li and Jianquan Wang (University of Electronic Science and Technology of China, P.R. China); WanBin Tang (University of Electronic Science & Technology of China, P.R. China); Xiaoping Li and Shaoqian Li (University of Electronic Science and Technology of China, P.R. China)

Subspace-based 1-Bit Wideband Spectrum Sensing

> Junquan Deng and Yong Chen (National University of Defense Technology, P.R. China)

Distributed Collaborative Wideband Spectrum Sensing Based on Multicoset Sampling

> Haosheng Weng (School of Electronics and Information Technology, Sun Yat-sen University, Guangzhou 510006, China); Huanhui Liang (School of Information Engineering, Guangzhou City Construction College,Guangzhou 510925,China); Minghua Xia (School of Electronics and Information Technology, Sun Yat-sen University, Guangzhou 510006, China)

Energy-Efficient Optimal Sensing and Resource Allocation of Soft Cooperative Spectrum Sensing in CRNs

> Cong Wang (Southeast University, P.R. China); Tiecheng Song (National Mobile Communications Research Laboratory, Southeast University, P.R. China); Jun Wu and Wei Jiang (Southeast University, P.R. China); Jing Hu (Southest University, PRC, P.R. China)

Blind Adaptive Compensation of Strong Frequency-Dependent IQ Imbalance for Wideband Direct-Conversion Receivers

> Xiangjie Xia, Ying Liu and Shihai Shao (University of Electronic Science and Technology of China, P.R. China); Juan Zhou (Chengdu University of Information Technology, P.R. China); Youxi Tang (University of Electronic Science and Technology of China, P.R. China)

Spectrum Sharing for Vehicular Communications in A Multi-operator Scenario

> Zhongjie He and Hangguan Shan (Zhejiang University, P.R. China); Yuanguo Bi (Northeastern University, P.R. China); Zhiyu Xiang (Zhejiang University, P.R. China); Zhou Su (Shanghai University, P.R. China); Tom H. Luan (Xidian University, P.R. China)

Session S-49: Learning-Driven Communications I

Multimedia Room I, 5th Floor

Friday, October 25, 16:00 - 17:30

Conference Chairs: Lisu Yu (Southwest Jiaotong University, P.R. China)

Deep Learning-Based Decoding of Block Markov Superposition Transmission

> Sheng Bi (School of Data and Computer Science, Sun Yat-sen University, P.R. China); Qianfan Wang (School of Electronics and Communication Engineering, Sun Yat-sen University, P.R. China); Zengzhe Chen (School of Electronics and Information Technology, Sun Yat-sen University, P.R. China); Jiachen Sun and Xiao Ma (Sun Yat-sen University, P.R. China)

Improved Tone Reservation Method Based on Deep Learning for PAPR Reduction in OFDM System

Lanping Li (Southwest Jiaotong University & Laboratory of Information Coding and Transmission, P.R. China); Chintha Tellambura (University of Alberta, Canada); Xiaohu Tang (Southwest Jiaotong University (SWJTU), P.R. China)

Q-Learning Based Adaptive Frequency Hopping Strategy Under Probabilistic Jamming

Yutao Wang (Army Engineering University of PLA, P.R. China); Yingtao Niu (National University of Defense Technology, P.R. China); Jianzhong Chen (Nanjing Telecommunication Technology Institute, P.R. China); Fang Fang and Chen Han (Army Engineering University of PLA, P.R. China)

Neural Network Assisted Active Constellation Extension for PAPR Reduction of OFDM System

Mingshan Zhang (Beijing Jiaotong University, P.R. China); Ming Liu (Beijing Jiaotong University & Beijing Key Lab of Transportation Data Analysis and Mining, P.R. China); Zhangdui Zhong (Beijing Jiaotong University, P.R. China)

Deep Learning Aided Friendly Coexistence of WiFi and LTE in Unlicensed Bands

Hao Gu (`Nanjing University of Posts and Telecommunications, P.R. China); Yu Wang, Sheng Hong and Guan Gui (Nanjing University of Posts and Telecommunications, P.R. China)

Hypergraph-Based SCMA Codebook Allocation in User-Centric Ultra-Dense Networks with Machine Learning

Lisu Yu (Southwest Jiaotong University, P.R. China); Hongliang Zhang (University of Houston, USA); Long Zhang (HEBEU, P.R. China); Lingyang Song (Peking University, P.R. China); Zhu Han (University of Houston, USA); Pingzhi Fan (Southwest Jiaotong Universityiversity, P.R. China)

Session S-50: Learning-Driven Communications II

Multimedia Room II, 6th Floor
Friday, October 25, 16:00 - 17:30
Conference Chairs: Pu Miao (Qingdao University, P.R. China)

Kernels Pruning for Volterra Digital Predistortion Using Sparse Bayesian Learning

Pu Miao (Qingdao University, P.R. China); Chenhao Qi and Yi Jin (Southeast University, P.R. China); Kang Song (Qingdao University & Southeast University, P.R. China); Teng Yu (Qingdao University, P.R. China)

Joint Time-frequency Anti-jamming Communications: A Reinforcement Learning Approach

Xufang Pei, Ximing Wang, Junnan Yao and Changhua Yao (PLA Army Engineering University, P.R. China); Jincheng Ge (Unit 95965 of PLA, P.R. China); Luying Huang and Dianxiong Liu (PLA Army Engineering University, P.R. China)

A Novel Neural Network Based Equalizer for Nonlinear Power Amplifiers

Zhenkun Qiu (University of Science and Techonology of China, P.R. China); Wuyang Zhou (University of Science and Technology of China, P.R. China)

Research on Path Selection for Space Network Based on Fuzzy Neural Network

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Symbol-Level Precoding Design for Intelligent Reflecting Surface Assisted Multi-user MIMO Systems

Rang Liu, Hongyu Li, Ming Li and Qian Liu (Dalian University of Technology, P.R. China)

# Building a Fully Connected Intelligent World

Huawei is a leading global provider of information and communications technology (ICT) infrastructure and smart devices. With integrated solutions across four key domains — telecom networks, IT, smart devices, and cloud services — we are committed to bringing digital to every person, home and organization for a fully connected, intelligent world.

Huawei's end-to-end portfolio of products, solutions and services are both competitive and secure. Through open collaboration with ecosystem partners, we create lasting value for our customers, working to empower people, enrich home life, and inspire innovation in organizations of all shapes and sizes.

At Huawei, innovation focuses on customer needs. We invest heavily in basic research, concentrating on technological breakthroughs that drive the world forward. We have more than 180,000 employees, and we operate in more than 170 countries and regions. Founded in 1987, Huawei is a private company fully owned by its employees.

For the past 30 years we have maintained an unwavering focus, rejecting shortcuts and easy opportunities that don' t align with our core business. With a practical approach to everything we do, we concentrate our efforts and invest patiently to drive technological breakthroughs. This strategic focus is a reflection of our core values: staying customer-centric, inspiring dedication, persevering, and growing by reflection.

The digital era has been generous. We will make the most of this historic opportunity, and boldly forge ahead to build a fully connected, intelligent world.
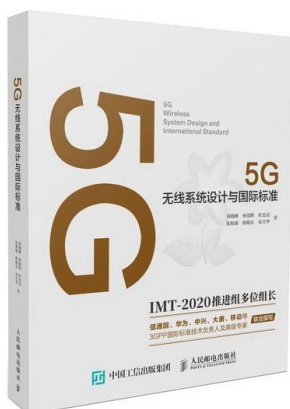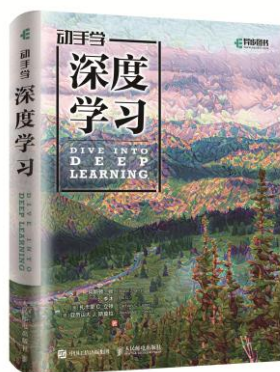
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