

Chengdu, China

January 6-8, 2023

2023 THE 6th WORLD CONFERENCE ON COMPUTING AND COMMUNICATION TECHNOLOGIES

WCCCT 2023

with workshop icWCSN 2023

2023 10th International Conference on Wireless Communication and Sensor Networks

Co-sponsors  **IEEE**  四川师范大学
Sichuan Normal University  Warsaw University
of Technology

CONFERENCE PROGRAM



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WELCOME MESSAGE

On behalf of Conference Committees, we welcome you to attend the 2023 the 6th World Conference on Computing and Communication Technologies (WCCCT 2023) and 2023 the 10th International Conference on Wireless Communication and Sensor Networks (icWCSN 2023) held in Chengdu, China during January 6-8, 2023. The conference was co-sponsored by IEEE, Sichuan Normal University and Warsaw University of Technology, host by College of Physics and Electronic Engineering of Sichuan Normal University.

With the recent outbreaks of COVID-19, to protect all participants' health and safety, while promising the good environment for the presentation and discussion, the conference committee made the decision to hold this conference online.

The conference aims to provide an interactive communication platform for practitioners to learn about the most cutting-edge academic and industrial application trends, to share the latest scientific research and technological achievements, innovative ideas and scientific methods in the field of artificial intelligence, to improve the level of academic research and industrial application in the field of intelligence so as to serve the global strategic deployment of new and old kinetic energy conversion, and promotes technology research, development, and application home and abroad.

We feel deeply grateful to all that have contributed to make this event possible: authors who contributed papers, the conference steering committee, the conference speakers, and the peer reviewers. Thanks are also extended to the conference administrative committee and the supporters for their tireless efforts throughout the course of the conference.

We hope that all participants and other interested readers benefit from and enjoy the presentations and proceedings and also find WCCCT 2023 and icWCSN 2023 stimulating in this process.

Conference Organizing Committees



Prof. Pingzhi Fan

*Fellow of IEEE, IET, CIE and CIC, IEEE Distinguished Lecturer
Southwest Jiaotong University, China*

BIO: Pingzhi Fan (PhD, IEEE Fellow) is currently the director and distinguished professor of the Institute of Mobile Communications, Southwest Jiaotong University, China, and a visiting professor of Leeds University, UK (1997-). He is a recipient of the UK ORS Award (1992), the National Science Fund for Distinguished Young Scholars (1998, NSFC), IEEE VT Society Jack Neubauer Memorial Award (2018), IEEE SP Society SPL Best Paper Award (2018), IEEE WCSP 10-Year Anniversary Excellent Paper Award (2009-2019), IEEE/CIC ICC Best Paper Award (2020), and WCSP Best Paper Award (2022). He served as a chief scientist of the National 973 Plan Project (National Basic Research Program of China) between 2012.1-2016.12. He serves as general chair or TPC chair of a number of IEEE conferences, including VTC2016Spring, ITW2018, IWSDA2022, PIMRC'2023, etc. His research interests include high mobility wireless communications, massive random-access techniques, signal design & coding, etc. He is an IEEE VTS Distinguished Speaker (2019-2025), a fellow of IEEE, IET, CIE and CIC.

Speech Title: Signal Design for Integrated Sensing & Communications

Abstract: Integrated Sensing and Communication (ISAC) combines sensing and communication systems to utilize wireless resources efficiently, realize wide area environment sensing, and even to pursue mutual benefits. The recent advances in signal processing and wireless communications have made ISAC a reality. This talk shall discuss the use cases of ISAC, ISAC signal requirements, and some new signal designs.



Prof. Nirwan Ansari

***IEEE Fellow, COMSOC Distinguished Lecturer
New Jersey Institute of Technology, USA***

BIO: Nirwan Ansari, Distinguished Professor of Electrical and Computer Engineering at the New Jersey Institute of Technology (NJIT), received his Ph.D. from Purdue University, MSEE from the University of Michigan, and BSEE (summa cum laude with a perfect GPA) from NJIT. He is a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) as well as Fellow of National Academy of Inventors (NAI).

He authored Green Mobile Networks: A Networking Perspective (Wiley-IEEE, 2017) with T. Han, and co-authored two other books. He has also (co-)authored more than 600 technical publications, over 340 published in widely cited journals/magazines. He has guest-edited a number of special issues covering various emerging topics in communications and networking. He is Editor-in-Chief of IEEE Wireless Communications Magazine and has served on the editorial/advisory board of over ten journals. His current research focuses on green communications and networking, cloud computing, drone-assisted networking, and various aspects of broadband networks.

He was elected to serve in the IEEE Communications Society (ComSoc) Board of Governors as a member-at-large, has chaired some ComSoc technical and steering committees, is current Director of ComSoc Educational Services Board, has been serving in many committees such as the IEEE Fellow Committee, and has been actively organizing numerous IEEE International Conferences/Symposia/Workshops. Some of his recognitions include several excellence in teaching awards, a few best paper awards, NCE Excellence in Research Award, several ComSoc TC technical recognition awards, NJ Inventors Hall of Fame Inventor of the Year Award, Thomas Alva Edison Patent Award, Purdue University Outstanding Electrical and Computer Engineering Award, NCE 100 Medal, NJIT Excellence in Research Prize and Medal, and designation as a COMSOC Distinguished Lecturer. He has also been granted more than 40 U.S. patents.

Speech Title: On Cloud-assisted Smart Transportation

Abstract: Extreme weather is threatening every aspect of our society. It is thus critical to mitigate the root cause of climate change. This talk provides a discourse on one particular aspect: exploiting the vehicular potential as a mobile resource for services including data communications, cloud storage, computing, and energy supply in a secure and sustainable manner by leveraging the mobile edge computing infrastructure.



Prof. Jiangzhou Wang

***Fellow of the Royal Academy of Engineering, UK (FREng), Fellow of IEEE, Fellow of IET,
IEEE Distinguished Lecturer
University of Kent, UK***

BIO: Jiangzhou Wang is a Professor at the University of Kent, U.K. His research interest is in mobile communications. He has published over 400 papers and 4 books. He was a recipient of the 2022 IEEE Communications Society Leonard G. Abraham Prize and the 2012 IEEE Globecom Best Paper Award. Professor Wang is a Fellow of the Royal Academy of Engineering, U.K., Fellow of the IEEE, and Fellow of the IET. He was the Technical Program Chair of the 2019 IEEE International Conference on Communications (ICC2019), Shanghai, the Executive Chair of the IEEE ICC2015, London, and the Technical Program Chair of the IEEE WCNC2013.

Speech Title: Artificial Intelligence applied to 6G Mobile Communications

Abstract: Because there are many vertical industry applications, mobile communication is developing very rapidly. This lecture will discuss the application of artificial intelligence/reinforcement learning in 6G mobile communications. The lecture will explain why mobile communication requires artificial intelligence/reinforcement learning and how it works, and finally give application examples.



Prof. Pascal Lorenz

University of Haute-Alsace, France

BIO: Pascal Lorenz (lorenz@ieee.org) received his M.Sc. (1990) and Ph.D. (1994) from the University of Nancy, France. Between 1990 and 1995 he was a research engineer at WorldFIP Europe and at Alcatel-Alsthom. He is a professor at the University of Haute-Alsace, France, since 1995. His research interests include QoS, wireless networks and high-speed networks. He is the author/co-author of 3 books, 3 patents and 200 international publications in refereed journals and conferences. He was Technical Editor of the IEEE Communications Magazine Editorial Board (2000-2006), IEEE Networks Magazine since 2015, IEEE Transactions on Vehicular Technology since 2017, Chair of IEEE ComSoc France (2014-2020), Financial chair of IEEE France (2017-2022), Chair of Vertical Issues in Communication Systems Technical Committee Cluster (2008-2009), Chair of the Communications Systems Integration and Modeling Technical Committee (2003-2009), Chair of the Communications Software Technical Committee (2008-2010) and Chair of the Technical Committee on Information Infrastructure and Networking (2016-2017). He has served as Co-Program Chair of IEEE WCNC'2012 and ICC'2004, Executive Vice-Chair of ICC'2017, TPC Vice Chair of Globecom'2018, Panel sessions co-chair for Globecom'16, tutorial chair of VTC'2013 Spring and WCNC'2010, track chair of PIMRC'2012 and WCNC'2014, symposium Co-Chair at Globecom 2007-2011, Globecom'2019, ICC 2008-2010, ICC'2014 and '2016. He has served as Co-Guest Editor for special issues of IEEE Communications Magazine, Networks Magazine, Wireless Communications Magazine, Telecommunications Systems and LNCS. He is associate Editor for International Journal of Communication Systems (IJCS-Wiley), Journal on Security and Communication Networks (SCN-Wiley) and International Journal of Business Data Communications and Networking, Journal of Network and Computer Applications (JNCA-Elsevier). He is senior member of the IEEE, IARIA fellow and member of many international program committees. He has organized many conferences, chaired several technical sessions and gave tutorials at major international conferences. He was IEEE ComSoc Distinguished Lecturer Tour during 2013-2014.

Speech Title: Advanced Architectures of Next Generation Wireless Networks

Abstract: Internet Quality of Service (QoS) mechanisms are expected to enable wide spread use of real time services. New standards and new communication architectures allowing guaranteed QoS services are now developed. We will cover the issues of QoS provisioning in heterogeneous networks, Internet access over 5G networks and discusses most emerging technologies in the area of networks and telecommunications such as IoT, SDN, Edge Computing and MEC networking. We will also present routing, security, baseline architectures of the inter-networking protocols and end-to-end traffic management issues.

Meeting Room Information

Password for all: 010608

Date	Arrangement	ZOOM Link
January 6, 2023	Pretest for Committee & Speakers	https://us02web.zoom.us/j/85654114102
	Pretest for Authors	https://us02web.zoom.us/j/84077966213
January 7, 2023	Opening Ceremony & Keynote Speech	https://us02web.zoom.us/j/85654114102
	Session 1	https://us02web.zoom.us/j/85654114102
	Session 2	https://us02web.zoom.us/j/84077966213
January 8, 2023	Session 3 & Session 4 & Session 5	https://us02web.zoom.us/j/85654114102

ZOOM Download Link

ZOOM Download: (Chinese version)

URL: https://www.zoomus.cn/cncluster/download_win.htm

ZOOM Download: (Oversea authors)

URL: <https://zoom.us/client/latest/ZoomInstaller.exe>

Presentation Tips

- ✚ **Enter the room 10-15 minutes in advance.**
- ✚ Prepare the PPT file of your presentation on your laptop in advance.
- ✚ **Duration of each Presentation:** about **12 Minutes of Presentation** and **3 Minutes of Q&A.**
- ✚ **Questions:** During the conference, if you have any question, please contact “Assistant” privately, you’ll get assisted immediately.
- ✚ **Duration of Oral Presentation:** 15 Minutes of Presentation including Q&A.
- ✚ **Dress Code:** All participants are required to dress formally. Casual wear is unacceptable. National formal dress is acceptable.
- ✚ **Note:** The regular oral presentation time arrangement is for reference only. In case any absence or some presentations are less than 15 minutes, please join your session before it starts.

January 6-8, Daily Schedule

January 6, 2023 | GMT+8, Beijing Time **Pretest**

Password for all: 010608

Pretest for Speakers and Committee		Zoom Link: https://us02web.zoom.us/j/85654114102
10:00-17:00	Pretest for Speakers (Breakout Room)	
	Pretest for Committee	
Pretest for Authors		ZOOM Link: https://us02web.zoom.us/j/84077966213
14:00-15:00	TN1002 TN1016 TN1034 TN1039 TN1042 TN2006 TN3101 TN1015 TN3106	
	TN1032 TN1033 TN1035 TN1045 TN1006 TN1007 TN2003 TN4310 TN1009 TN1013	
	TN1008 TN1012 TN1019 TN1038 TN1040 TN3104 TN3207 TN4312 TN4313 TN4308	
15:30-16:00	TN1010 TN1017 TN2001 TN1022 TN1030 TN2004 TN1043 TN4314 TN1024	
	TN4311 TN1028 TN1044 TN1048 TN4415 TN4417 TN1001 TN1051 TN1049	

January 7, 2023 | GMT+8, Beijing Time

Meeting Link: <https://us02web.zoom.us/j/85654114102> **(Meeting ID: 856 5411 4102)**

Password: 010608

Host: **Assoc. Prof. Sanshan Sun**, Sichuan Normal University, China

09:00-09:05	Welcome Message Prof. Lei Liao , <i>Deputy Dean of College of Physics and Electronic Engineering</i> , Sichuan Normal University, China
09:05-09:10	Opening Remarks Prof. Krzysztof Szczypiorski , Warsaw University of Technology, Poland
Group Photo	
09:10-09:55	Keynote Speech I Prof. Pingzhi Fan , <i>Fellow of IEEE, IET, CIE and CIC, IEEE Distinguished Lecturer</i> , Southwest Jiaotong University, China Speech Title: Signal Design for Integrated Sensing & Communications
09:55-10:40	Keynote Speech II Prof. Nirwan Ansari , <i>IEEE Fellow, COMSOC Distinguished Lecturer</i> , New Jersey Institute of Technology, USA Speech Title: On Cloud-assisted Smart Transportation
10:40-11:00	Break Time
11:00-11:45	Keynote Speech III Prof. Jiangzhou Wang , <i>Fellow of the Royal Academy of Engineering, UK (FREng), Fellow of IEEE, Fellow of IET, IEEE Distinguished Lecturer</i> , University of Kent, UK Speech Title: Artificial Intelligence applied to 6G Mobile Communications
11:45-14:00	Break Time

14:00-14:45	<p>Keynote Speech IV</p> <p>Prof. Pascal Lorenz, University of Haute-Alsace, France</p> <p>Speech Title: Advanced Architectures of Next Generation Wireless Networks</p>
14:45-15:00	Break Time
15:00-17:15	<p>SESSION 1</p> <p>Communication Theory and Information System</p> <p>Session Chair: Assoc. Prof. Youzhi Xiong, Sichuan Normal University, China</p> <p>ZOOM Link: https://us02web.zoom.us/j/85654114102</p> <p>TN1002 TN1016 TN1034 TN1039 TN1042 TN2006 TN3101 TN1015 TN3106</p>
15:00-17:30	<p>SESSION 2</p> <p>Electronic and Communication Engineering</p> <p>Session Chair: Assoc. Prof. Xuan Zhang, Sichuan Normal University, China</p> <p>ZOOM Link: https://us02web.zoom.us/j/84077966213</p> <p>TN1032 TN1033 TN1035 TN1045 TN1006 TN1007 TN2003 TN4310 TN1009 TN1013</p>

January 8, 2023 | GMT+8, Beijing Time

Meeting Link: <https://us02web.zoom.us/j/85654114102> **(Meeting ID: 856 5411 4102)**

Password: 010608

09:30-12:00	SESSION 3 Session Topic: Wireless Transmission and IoT Technology Session Chair: Assoc. Prof. Hao He, Sichuan Normal University, China TN1008 TN1012 TN1019 TN1038 TN1040 TN3104 TN3207 TN4312 TN4313 TN4308
11:45-13:30	Break Time
13:30-15:45	SESSION 4 Session Topic: Information Model Analysis and Image Processing Session Chair: Assoc. Prof. Wenchen Han, Sichuan Normal University, China TN1010 TN1017 TN2001 TN1022 TN1030 TN2004 TN1043 TN4314 TN1024
15:45-16:00	Break Time
16:00-18:15	SESSION 5 Session Topic: Sensing and Computing in the Communication System Session Chair: Assoc. Prof. Sanshan Sun, Sichuan Normal University, China TN4311 TN1028 TN1044 TN1048 TN4415 TN4417 TN1001 TN1051 TN1049

Author Presentation Session 1

January 7, 2023 | 15:00-17:15, GMT+8, Beijing Time

SESSION 1 - Communication Theory and Information System

Session Chair: Assoc. Prof. Youzhi Xiong, Sichuan Normal University, China

TN1002 TN1016 TN1034 TN1039 TN1042 TN2006 TN3101 TN1015 TN3106

Meeting Link: <https://us02web.zoom.us/j/85654114102> Password: 010608

<p>TN1002 15:00-15:15</p>	<p>Routing Architecture Design for the Space-Ground Integrated Information Network Xin Xu, Chaoying Dong, Jun Cai Presenter: Xin Xu, Institute of Communication Engineering Army Engineering University of PLA, China</p> <p>Abstract: Space-Ground Integrated Information Network is the core infrastructure for information acquisition, distribution, transmission and application in the future. Routing architecture is the critical part for this network. This paper presents two types of routing architecture, Independent AS routing architecture and Tunnel-encapsulated routing architecture, based on Border Gateway Protocol for the Space-Ground Integrated Information Network. The path choosing, fault recovery, management and control, and routing scheme of these two architectures are discussed in detail. The analysis shows that the Independent AS routing architecture has an advantage in management and scalability, while the Tunnel-encapsulated routing architecture is more suitable for the early stage of the SGIIN.</p>
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<p>TN1016 15:15-15:30</p>	<p>Power Allocation in Cell-Free mmWave Massive MIMO: Using Deep Deterministic Policy Gradient Yu Zhao, Fengming Zhang, Yangjun Gao, Chaoqi Fu Presenter: Yu Zhao, Airforce Engineering University, China</p> <p>Abstract: This paper studies the weighted sum-spectral efficiency (SE) power allocation problem in cell-free (CF) mmWave massive multiple-input multiple-output (MIMO) with mobile user equipments (UEs). This is a non-convex problem that needs to be solved within a time constraint of the channel state information (CSI) variation. Although several heuristic methods, e.g., the weighted minimum mean square error (WMMSE) algorithm, have been developed to solve this problem, these methods entail considerable computational complexity therefore hardly meet the time constraint. To address this issue, we propose a deep reinforcement learning (DRL) solution based on the deep deterministic policy gradient (DDPG) method. It only needs several layers of neural network to perform the power allocation. The numerical results, obtained from a particular 3GPP scenario, show that the proposed DDPG method outperforms the existing algorithms.</p>
<p>TN1034 15:30-15:45</p>	<p>Joint Rate and Resource Allocation for Panoramic Videos Over Future Network Rui Deng Presenter: Rui Deng, Shaanxi Normal University, China</p> <p>Abstract: With the popularity of panoramic video, it is urging research on the viewpoint-aware adaptive streaming methods to alleviate the resource shortage of wireless networks thus providing higher quality of experience (QoE) for the users. Therefore, in this paper, we focus on MEC-assisted 5G heterogeneous network system, and formulate a novel joint rate and resource allocation optimization problem with the aim of maximizing the overall QoE of all users, which comprehensively takes the characteristics of panoramic video in quality assessment, the delay requirements and the resource constraints into account. To solve this problem with low complexity, a heuristic algorithm based on Lagrange Relaxation and Greedy strategy is developed. The simulation results show that our algorithm can improve the overall performance of all users in the video quality, the quality fluctuation and the interruption time.</p>
<p>TN1039 15:45-16:00</p>	<p>IDEAL: Intent Driven Emerging Anti-congestion Router with Load-balance for SDN Junjie Guo, Chungang Yang, Fuqiang Li, RuDong, Yanbo Song, and Shiwen Kou Presenter: Junjie Guo, Xidian University, China</p> <p>Abstract: With the development of software-defined network, network managers can manage and control rich network devices through a unified OpenFlow protocol; however, network managers still need to configure the network manually. Moreover, with the</p>

	<p>increasing number of huge network devices, it is required to be timely without configuration errors, which leads to high knowledge and experience requirements for network managers. In this work, we propose an Intent Driven Emerging Anti- congestion Router with Load-balance considerations, which is termed as IDEAL system. The presented IDEAL system can analyze the user intents and make network configurations to satisfy their requirements without managers manual operation in the network. Moreover, the IDEAL system can always select the optimal routing paths according to the current global network status, and automatically switch the links for users when the net- work fails. Finally, we present a proof-of-concept demonstration of the feasibility and performance enhancement of the presented IDEAL system.</p>
<p>TN1042 16:00-16:15</p>	<p>A Continue-Domain Sparse-Based Channel Estimation Method in Power Tunnel Communication Wei Liu, Tian Liang, Ti Guan, Kun Zhang, Wenshuang Wang, Dan Wang Presenter: Dan Wang, Southeast University, China</p> <p>Abstract: The closedness of the power tunnel causes multipath effect at the receiving end in the wireless communication system, seriously affecting the communication quality. In this paper, we propose a meshless channel estimation method in continuous domain for complex tunnel environment. Discretization of the continuous domain is prone to grid mismatch problems. The atomic norm minimization method can improve estimation accuracy without meshing the grids. By comparing the estimation abilities of the proposed method with the traditional channel estimation methods in the same power tunnel environment, it can be seen that the ANM method can obtain a lower bit error rate (BER) and a smaller normalized mean square error (NMSE) value under medium and high signal-to-noise regions.</p>
<p>TN2006 16:15-16:30</p>	<p>Review of 5G MIMO Enhancement Technologies Hua Xu, Jincan Xin, Sen Xu, Hua Zhang, Shangkun Xiong Presenter: Hua Xu, China Telecom Research Institute, China</p> <p>Abstract: To improve spectral efficiency, system capacity and throughput, and achieve higher peak rate, multi-antenna technology has been widely used in wireless network construction since the 4G LTE period. With the promotion of 5G network business deployment and the rapid development of wireless technology, new business forms are gradually formed, and the corresponding quality of service requirements are more stringent. In order to meet the user service experience of new applications, wireless technology continues to evolve in signaling delay, signaling overhead, spectral efficiency and coverage, and various solutions have been formed in the research of multi-antenna technology. This paper introduces the 5G NR MIMO enhancement technology scheme and standard evolution, analyzes the principle and performance advantages of key technologies and looks forward to the evolution direction of</p>

	multi-antenna technology enhancement.
TN3101 16:30-16:45	<p>An SISO-OTFS Channel Parameter Learning Scheme in Time-Frequency Domain Wentao Kan, Xiandeng He, Nan Chen Presenter: Wentao Kan, Xidian University, China</p> <p>Abstract: Orthogonal Time Frequency Space (OTFS) modulation is a recently proposed modulation pattern aiming to overcome problems in high mobility scenarios. Parameter learning, including both the Delay-Doppler(DD) domain and the Time-Frequency(TF) domain learning, is one of the most important research direction of OTFS. Rough parameter learning in the TF domain is preferred for its lower cost. In this paper, we proposed a Time-Frequency domain parameter learning scheme in Single-Input Single-Output OTFS (SISO-OTFS) scene. Firstly, the 2D uplink(UL) channel model and the received signal model are studied, where the problem is converted into a sparse estimation problem. Secondly, Fast Fourier Transform(FFT) is utilized to precisely estimate the doppler shift and the channel gain of each path. Thirdly, rough and accurate searches are applied to get a precise estimation of the doppler shift and time delay. With the proposed scheme, the estimation complexity is reduced, and the prior knowledge for more precise DD domain pilot design and channel estimation could be acquired.</p>
TN1015 16:45-17:00	<p>Multiple Flipping Strategy LISBF for LDPC Codes Sun Yishan, Huang Pingyang, Zhang Yichun, Cheng Zhiyuan Presenter: Sun Yishan, Zhejiang University, China</p> <p>Abstract: The performance and complexity of low-density parity-check (LDPC) decoders have strict requirements since they are widely demanded in both communication and storage systems. Information storage bit flipping (ISBF) decoder and layered ISBF (LISBF) decoder demonstrate excellent decoding performance and throughput in which the global maximum finding operation can be calculated in parallel to other decoding operations. However, their error-correction performance is not satisfactory. In this paper, we consider a variety of optimizations based on LISBF and propose a new algorithm named multiple flipping strategy LISBF (MLISBF). First, a high probability is adopted to flip those bits with high energy values. Second, strict flipping with a lower threshold is triggered when the syndrome weight is negligible. Then, we introduce perturbation flipping at specific iterations to help the decoder overcome trapping sets.</p>
TN3106	<p>Sparse Channel Estimation for IRS-Assisted Communication System Based on Denoising Autoencoder Yuanxinyu Luo, Yunhui Yi, Xiandeng He, Jiahui Hao</p>

17:00-17:15

Presenter: Yuanxinyu Luo, Xidian University, China

Abstract: Intelligent reflective surface (IRS) technology, as a promising technology, can help the traditional communication system to achieve better communication results with lower overhead. It is very necessary to design an effective channel estimation scheme, which is the basis for IRS to adjust the amplitude and phase of the incident signal. In this paper, the denoising autoencoder (DAE) is used to solve the channel estimation problem of IRS-assisted uplink millimeter wave channel from the user to the base station (BS). The two-stage channel model of user-IRS-BS can't be directly processed by deep learning network. Therefore, in the channel modeling part, the original two-stage channel is unified into a cascaded channel, the problem of channel estimation is transformed into the recovery problem of undersampled signals. In the part of network model training, an end-to-end channel estimation scheme based on stacked DAE is proposed. A group of orthogonal pilot signals received by BS are used as the input of encoder. These data are first compressed into low-dimensional feature data, and then reconstructed into high-dimensional data in reverse. The output of decoder is the channel state information (CSI). After several iterations, the training ends when the normalized mean square error of the output CSI and the original CSI is minimum. In this process, the weight matrix model including the data hiding relationship is trained. In this paper, the training and verification of the channel estimation schemes is completed based on the self-simulated channel model data set. Three traditional channel estimation schemes, least square, orthogonal matching pursuit and synchronous orthogonal matching pursuit and our DAE scheme are used to calculate and estimate the CSI of the channel model. Simulation results show that our DAE scheme has better performance than the traditional scheme, it has smaller normalized minimum mean square error (NMSE) under the same parameters.

Author Presentation Session 2

January 7, 2023 | 15:00-17:30, GMT+8, Beijing Time

SESSION 2 - Electronic and Communication Engineering

Session Chair: Assoc. Prof. Xuan Zhang, Sichuan Normal University, China

TN1032 TN1033 TN1035 TN1045 TN1006 TN1007 TN2003 TN4310 TN1009 TN1013

Meeting Link: <https://us02web.zoom.us/j/84077966213> Password: 010608

<p>TN1032 15:00-15:15</p>	<p>A Low Noise and Spur Sub-Sampling Phase Locked Loop based on Clock System Yue Yang, Shuxiang Song, Mingcan Chen, Pinqun Jiang, Chaobo Cai Presenter: Yue Yang, Guangxi Normal University, China</p> <p>Abstract: To solve the noise and spurious problems of the Charge Pump Phase-Locked Loop (CPPLL), this paper presents a Sub-sampling Phase-Locked Loop (SSPLL), which has an output frequency of 64MHz with low noise and low spur. Subsampling technology is used to reduce the in-band noise of the SSPLL. By designing an excellent performance Sub-sampling Charge Pump (SSCP) and Sub-sampling Phase Detector (SSPD), the spur reference of the Voltage Controlled Oscillator (VCO) output clock and the mismatch of current are decreased. The SSPLL is implemented in SMIC 110nm CMOS process consuming 1.85mW from 1.2V supply and occupying an area of 0.12x0.10mm². The in-band noise of the SSPLL at 10KHz is -118.36dBc/Hz and the reference spur of the VCO output clock is -89.31dB.</p>
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<p>TN1033 15:15-15:30</p>	<p>A 2.4 GHz SiGe Envelope Tracking Power Amplifier for LTE Applications Yongkang Jing, Bihui Zhu Presenter: Yongkang Jing, Southeast University, China</p> <p>Abstract: This paper presents a 2.4 GHz SiGe Power Amplifier based on envelope tracking (ET) technology for long term evolution (LTE) application, aiming to improve efficiency. The ET consists of envelope detector and envelope modulator. Using linear amplifier assisted switching amplifier to improve the system bandwidth, the proposed technique enhances the PA's back-off efficiency. The power amplifier is designed in 0.18um SiGe process and simulated with LTE16QAM signal. The simulated peak output power is 30.1 dBm at 2.4 GHz with 42% peak power added efficiency (PAE) and average output power is 24.6 dBm with 24% average PAE.</p>
<p>TN1035 15:30-15:45</p>	<p>High Angle Stability Frequency Selective Surface Design and Simulation Lin Feng, Yang Zhen, Pang Xiaoyu Presenter: Feng Lin, Shenyang Aircraft Research Institute, China</p> <p>Abstract: Frequency selection surfaces have been successfully used in radar radome design with low radar cross section. In this paper, a double-layer frequency selective surface structure with Ku band insensitive to large angle and polarization is designed. Based on the physical structure of FSS, the equivalent circuit model is established, and the upper and lower layers of the model can be regarded as two GSL (gristable square loops). The electromagnetic simulation software HFSS is used to analyze the designed model. Finally, a waveguide slot antenna is designed to verify the designed FSS.</p>
<p>TN1045 15:45-16:00</p>	<p>A Method of Counteracting Main Lobe Deceptive Jamming With Frequency Diverse Array Jihong Yan, Yuhuan Ju, Shunxiang Wang, Xu Feng, Jinghuai Xiao, Juelin Luo Presenter: Shunxiang Wang, University of Electronic Science and Technology of China, China</p> <p>Abstract: In this paper, a jamming nulling method to counteract the deception jamming of the main lobe is studied. The radar adopts the frequency diverse array transmitting mode and the phased-array receiving mode. In this way, when the main lobe of the transmit beam pattern of the frequency diverse array is aligned at the desired target, the null is formed at other target positions. The problem that when using a frequency diverse array to identify a desired target, other targets can still jam the radar if they are on the high side lobe of the frequency diverse array beam pattern is solved. Computer simulation results show that the jamming nulling method adopted in this paper is feasible and effective.</p>

<p>TN1006 16:00-16:15</p>	<p>Weight Discretized BP Algorithm based on Synapse Transistor with Symmetric/Asymmetric Memory Curve Sheng Chen, Lei Han, Kuan Sun, Di Luo, Yi-Ming Wang, Yu-Tao Li, Du-Li Yu Presenter: Sheng Chen, Wuhan University, China</p> <p>Abstract: Nowadays artificial intelligence is widely used in various application fields, such as image recognition, audio recognition, intelligent control and so on. In the field of brain-like computing, the synaptic transistor is a core device that can simulate the computing patterns of the human brain, and evaluating its performance through intelligent algorithm is important for the subsequent construction of neural networks. In this paper, based on the synaptic transistor memory characteristic curve, the influence of discreteness, symmetry/asymmetry and non-linearity on the performance of weight discretized BP neural network algorithm are investigated. The data set of 10 digits image samples acquired from Chars74K English Character data set were unitized to evaluate the recognition accuracy of the BP algorithm. The results show that since the conductance of the device is discrete, the effect of this discreteness on its performance is not negligible when the number of discrete points is small. The effect of this discreteness is influenced by the number of discrete points, and the discreteness can be neglected when the number of discrete points exceeds a threshold. More interesting, this threshold can be reduced by an asymmetric model and a lower degree of nonlinearity. Compared with symmetry model, the complementarity of the asymmetric model leads to more uniform values of discrete weights, which can improve the recognition accuracy of the neural network. This research has a guiding significance for the hardware selection and modeling of artificial intelligence algorithm.</p>
<p>TN1007 16:15-16:30</p>	<p>Online Distribution Method of Application Key based on AKMA Jinhui Li, Jinhua Wang, Chengbin Huang Presenter: Jinhui Li, China Telecom Research Institute, China</p> <p>Abstract: With the development of information technology, security issues such as 5G + Industrial Internet and Internet of Things have attracted more and more attention. This article first introduces that the Third Generation Partnership Project (3GPP) has defined a series of 5G network security technology systems, such as primary authentication, secondary authentication, GBA, AKMA etc. Secondly, this paper analyzes the security problems such as initial key leakage existing in popular security technologies in the current 5G + Industrial Internet, Internet of Things and other scenarios. Finally, in view of the security problems existing in 5G+Industrial Internet, an online password distribution method based on AKMA is designed. The method realizes the generation and online distribution of the application key, and at the same time realizes the functions of regular update and safe storage of the application key, and solves the above-mentioned security problems.</p>

<p>TN2003 16:30-16:45</p>	<p>A Chinese Speech Recognition System based on Binary Neural Network and Pre-processing Lunyi Guo, Yijie Deng, Liang Tang, Ronggeng Fan, Bo Yan and Zhuoling Xiao Presenter: Lunyi Guo, University of Electronic Science and Technology of China, China</p> <p>Abstract: Neural networks have made excellent progress in the field of speech recognition. However, more research needs to be done in some scenarios where computational resources are limited or real-time, and low power consumption is required. In this paper, we propose a lightweight speech recognition model based on pre-processing + binary neural network, which can significantly reduce the number of weight parameters while ensuring an acceptable error rate. The speech pre-processing part converts the 1D speech signal to the 2D Mel spectrum and uses Voice Activate Detection (VAD) to make the speech Mel spectrum input variable. The speech data set is also expanded using data augmentation methods. For convolutional layers, the weights are binarized to reduce the number of model parameters and improve computational and storage efficiency. The number of model parameters after quantization is 6.94% of the number of full precision model parameters, and the error rate on the ST CMD speech dataset increases by only 2.07%. Finally, a circuit structure based on binary weights for convolutional computation is designed, and a single multiplication can be implemented using only the hardware resources of the 7 Look Up Table (LUT).</p>
<p>TN4310 16:45-17:00</p>	<p>Multi-Object Tracking based on RGB-D Sensors Keliang Zhu, Xuemei Shi, Tianzhong Zhang, Huasong Song, Jinlin Xu, Liangfeng Chen Presenter: Liangfeng Chen, Hefei Institutes of Physical Science, Chinese Academy of Sciences, China</p> <p>Abstract: The accuracy performance of the multi-object tracking (MOT) only by the camera without depth info is usually poor. In this paper, we propose a MOT method based on sensors composed of the camera and the ultra-wide band (UWB) radar, which are similar to the depth camera (RGB-D camera). First, we establish a backbone network to extract feature maps from video frames captured by a camera. Then, we combine Faster R-CNN with a re-ID branch to detect objects including the category, coordinate and ID. To track objects, we construct a similarity matrix to calculate the data association between the objects and their historical trajectories. The matrix's elements are calculated by the intersection over union (IoU) between the objects and their related two types of trajectories. One tracker is formed by image, and the other is formed by UWB. The experimental results show that our method achieves multi-object recognition and tracking, and outperforms previous methods by a large margin on several public datasets.</p>
<p>TN1009 17:00-17:15</p>	<p>Reconfigurable Intelligent Surface Aided DFRC Vehicular Networks Junming Feng, Peichang Zhang, Lei Huang, Gongbin Qian Presenter: Junming Feng, Shenzhen University, China</p>

	<p>Abstract: Reconfigurable Intelligent Surface (RIS) has been considered as a promising technology for 6G networks, which is capable of directionally reflecting the incident signal by adjusting phase shift of its reflecting elements, and thus to achieve beamforming. In this paper, we investigate the potential of employing RIS in dual-functional radar-communication (DFRC) vehicular networks. Considering a vehicle-to-infrastructure (V2I) communication in non-line-of-sight(N-LoS) scenario, where RIS is deployed to establish sensing and communication links, we propose a scheme to optimize the beamforming based on the detected vehicle position for the sake of avoiding the relatively large channel estimation overhead. More specifically, we build a codebook to maintain the optimal phase shift of RIS corresponding to each candidate angle offline, which can be used for detecting the direction of vehicle in N-LoS scenario. In addition, the position-based channel state information (CSI) is introduced and used for maximize the downlink rate. Simulation results show that by deploying RIS in DFRC vehicular networks, the base station can detect the vehicle position in N-LoS scenario and provide it with reliable communication rates without channel estimation.</p>
<p>TN1013 17:15-17:30</p>	<p>CIMAX-Compiler: An End-to-End ANN Compiler for Heterogeneous Computing-In-Memory Platform Chen Yang, Yawei Wang, Lei Wu, Xiang Qiu Presenter: Yawei Wang, Xi'an Jiaotong University, China</p> <p>Abstract: As artificial neural network (ANN) being widely adopted in edge applications, such as voice recognition, and face detection, etc. Computing-In-Memory (CIM) accelerators have received much attention because they are faster and more energy efficient. However, existing compilers are mainly applicable for traditional backend devices rather than emerging hardware architectures like CIM accelerator. In this paper, we propose an end-to-end neural network compiler, named CIMAX-Compiler. It can convert an ANN model in Open Neural Network Exchange (ONNX) format to executable codes, which runs on a heterogeneous embedded system composed of an MCU and a CIM accelerator. CIMAX-Compiler greatly reduces model deployment effort from tens of engineer-hours to less than a second. In addition, we applied several optimization techniques such as operator fusion and convolution compression to further improve compiled code performance. Experimental results show that the optimized code can speed up ANN model inference performance by more than 2× compared with the base-line layer to layer implementation.</p>

Author Presentation Session 3

January 8, 2023 | 09:30-12:00, GMT+8, Beijing Time

SESSION 3 - Wireless Transmission and IoT Technology

Session Chair: Assoc. Prof. Hao He, Sichuan Normal University, China

TN1008 TN1012 TN1019 TN1038 TN1040 TN3104 TN3207 TN4312 TN4313 TN4308

Meeting Link: <https://us02web.zoom.us/j/85654114102>

Password: 010608

<p>TN1008 09:30-09:45</p>	<p>Distributed Phase Calibration for Massive OAM Backhauling in 5G IoT Environments Xuanzhong Wang, Yanan Zhang, Zhutian Li Presenter: Yanan Zhang, Beijing Fibrlink Communications Co., LTD., China</p> <p>Abstract: The Internet of Things (IoT) plays an important role in 5G communications. Large number of 5G end modules supports the communications of different types of IOT applications, which constantly put forward requirements for high capacity communication technology. In IOT applications, distributed end nodes can construct virtual uniform circular arrays (UCAs), thus performing high capacity UCA based orbital angular momentum (OAM) communication. However, phase deviation exists in the distributed radio chains, which destroys the orthogonality among OAM modes and deteriorates the communication performance. In order to overcome the problem, we propose a phase calibration scheme in this paper. The scheme consists of the phase deviation computation method and the signaling interaction process. Through the signaling interaction, each end node obtains different phase deviation information. Then, the target phase deviation can be calculated based on the computation method. The phase deviation computation only involves linear equations and the quantitized phase value is transmitted during the signaling interaction process. Therefore, the proposed scheme brings little overhead to the</p>
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	normal communications. Simulation results indicate that the proposed calibration scheme can achieve high performance under different signaling precisions, and greatly improves the capacity of the uplink communication for the distributed IOT end nodes.
TN1012 09:45-10:00	<p>Timestamp Free Synchronization with Clock Skew Estimation in Wireless Sensor Networks Shaoqi Wang, Lei Sun Presenter: Shaoqi Wang, Beijing Institute of Technology, China</p> <p>Abstract: Time synchronization is crucial for applications such as object tracking and system analysis in Wireless Sensor Networks (WSNs). The existence of clock skew will cause clocks of different nodes to drift at different rates. In this paper, a novel time synchronization scheme combining timestamp-free and one-way communication is proposed, which provides improved clock skew estimation. The proposed scheme has no additional communication overhead and mitigates the power consumption. Based on the proposed scheme, the Window Maximum Likelihood Estimator (WMLE) for clock skew is proposed, which utilizes a minimized subset of observations to estimate clock skew. Cramer-Rao Lower Bound (CRLB) of the WMLE under Gaussian random delay model is derived. The efficiency of the proposed estimator has been validated by simulation results.</p>
TN1019 10:00-10:15	<p>Research on Intelligent Monitoring of Offshore Wind Turbine Environment Based on Wireless Transmission and Distributed Computing Zhichao Wu, Yong Yao, Shizhu Li, Chi Yu, Chuan Chen, Tingcheng Huang Presenter: Zhichao Wu, Guangdong Energy Group Science and Technology Research Institute Co., Ltd, China</p> <p>Abstract: The marine ecosystem is a dynamic system, and offshore wind power can make efficient use of marine resources and marine space. Hence, it is important to perform the research on intelligent monitoring of offshore wind turbine environment based on wireless transmission and distributed computing. To this end, we first investigate a mobile edge computing (MEC) system, in which a mobile device offloads its task to several edge nodes (ENs). Specifically, practical MEC scenarios are studied, in which the task of mobile device should be completed within a given latency threshold. Moreover, to facilitate the performance evaluation, we define the outage probability (OP) for the considered MEC system and further analyze the outage performance of the considered MEC system, where an analytical expression of OP as well as the asymptotic one is derived. Finally, we show some simulation and analytical results to verify how some key parameters affect the intelligent monitoring of offshore wind turbine environment based on wireless transmission and distributed computing.</p>
TN1038 10:15-10:30	<p>RIS Relaying UAV-Aided WPCN for Throughput Maximization Xinhong Pan, Zhihai Zhang, Heyun Lin, Jiaying Zhang Presenter: Jiaying Zhang, South China University of Technology, China</p>

	<p>Abstract: This paper studies a reconfigurable intelligent surface (RIS) relaying unmanned aerial vehicle (UAV)-aided wireless powered communication network (WPCN), where a RIS acts as a relay and a UAV acts as a hybrid access point (HAP). Under this setup, we jointly optimize the UAV's 2D hovering location and reflective beamforming vector at the RIS, for the purpose of maximizing the minimum throughput among all the ground users. To solve the non-convex min-throughput maximization problem, we propose a low-complexity alternating optimization approach to divide the original problem into two subproblems and solve them sequentially. In particular, we optimize the UAV's 2D hovering location based on successive convex approximation (SCA) and the reflective beamforming vector by applying the technique of semi-definite relaxation (SDR). Numerical results verify the efficiency and performance of the algorithm and show that the proposed RIS relaying UAV-aided WPCN achieves significant performance gains over the conventional WPCN.</p>
<p>TN1040 10:30-10:45</p>	<p>Title: Intent-Driven Internet of Things: Architectures, Technology, and Challenges Lulu Zhang, Ru Dong, Fuqiang Li, Jiaming Zhang, Jingwen Zhang, Chungang Yang Presenter: Lulu Zhang, Xidian university, China</p> <p>Abstract: The Internet of Things (IoT) aims to connect everything. However, with the emergence of large-scale heterogeneous devices, the complexity of network configuration and management becomes increasingly prominent, and it becomes more and more urgent for infrastructure to automatically and adaptively update the configuration according to the business requirements. Intent-driven Network (IDN) has the advantages of user friendliness, fine-grained policy mapping and closed-loop verification. IDN can promote the improvement of traditional IoT configuration and management methods, and further achieve the goal of improving user experience. First, we review the development of IoT architecture and propose an intent-driven IoT architecture. We then analyze the key technologies involved in the architecture and provide a list of typical intent-driven IoT platforms from industry and academia. Finally, the future research challenges of intent-driven IoT are briefly discussed.</p>
<p>TN3104 10:45-11:00</p>	<p>Automatic Gain Control of Wireless Receiver Based on Q-Learning Shuo Yang, YunHui Yi, XianDeng He, JunWei Chai Presenter: Shuo Yang, Xidian University, China</p> <p>Abstract: In the wireless communication system, due to the complexity of the physical channel, the amplitude of the signal received by the wireless receiver often fluctuates greatly, which will increase the bit error rate of signal demodulation. Therefore, the automatic gain control (AGC) is an important part of the wireless receiver, which can adaptively adjust the gain of each part of the receiver and provide a stable input for the subsequent circuit. With the development of artificial intelligence technology, the application of reinforcement learning in signal</p>

	<p>processing has received extensive attention. This paper proposes a gain automatic control method based on Q-learning in zero-IF receiver, which uses the Q-learning model to learn the characteristics of signal amplitude changes to adjust the speed of the AGC, in order to track the signal changes more accurately. The simulation results show that the AGC proposed in this paper is not only more stable than the traditional AGC without Q-learning but also can quickly compensate for significant changes in Orthogonal Frequency Division Multiplexing (OFDM) signals.</p>
<p>TN3207 11:00-11:15</p>	<p>Performance Evaluation of Tandem Spreading Multiple Access with Polar Code System for IoT-Railways Huichao Shang, Ruifeng Chen, Guoyu Ma, Haoxiang Zhang, Ruisi He, Bo Ai, Zhangdui Zhong Presenter: Huichao Shang, Beijing Jiaotong University, China</p> <p>Abstract: With the rapid development of high-speed railways, intelligent railways have attracted much attention in railway industries and research institutes all over the world. The internet of things for railways (IoT-R) plays an important role for intelligent railways. In order to use limited radio resources to support massive low-cost and low-energy users in IoT-R, advanced multiple access technology becomes important. Tandem spreading multiple access (TSMA) is a recently proposed non-orthogonal multiple access scheme that uses a non-iterative receiver to solve the problem of data collision. In addition, TSMA can improve data transmission reliability and user connection capability at the expense of user data rate. Therefore, TSMA shows its potential in IoT-R. However, IoT-R has high requirements for data transmission reliability. In order to further improve data transmission reliability in IoT-R, TSMA with polar code system is proposed in this paper. Different from channel pre-compensation method used in the original TSMA system, the least squares channel estimation is applied in TSMA with polar code system. In addition, zero-forcing (ZF) equalizer and minimum mean square error (MMSE) equalizer are applied in TSMA with polar code system. Simulation results show that block error rate of TSMA with polar code system in both additive white Gaussian noise channel and Rayleigh fading channel is lower than that of TSMA system. In addition, TSMA with polar code system using MMSE equalizer has better performance than TSMA with polar code system using ZF equalizer.</p>
<p>TN4312 11:15-11:30</p>	<p>Sum-rate Maximization for RIS-assisted IoT Zichen Xing, Yunhui Yi, Xiandeng He, Junwei Chai, Yuanxinyu Luo, Xingcai Zhang Presenter: Zichen Xing, Xidian University, China</p> <p>Abstract: With the development of smart devices, Internet of Things(IoT) has requirements for high coverage, high reliability, and low power consumption for wireless communication systems. The emergence of reconfigurable intelligent surfaces(RIS) provides an achievable solution for further development of IoT. RIS consists of passive low-cost components, which can reshaping the wireless channel. Thus it can extend communication coverage, improve multi-stream transmission gain, enhance edge coverage, and realize large-scale</p>

	<p>Device-to-Device communication. In this paper, we consider RIS-assisted multiple-input single-output(MISO) downlink communication systems, and our goal is to maximize the sum-rate of all IoT receiving devices by jointly designing the beamforming of access points(AP) and the phase shift of RIS elements. For the non-convex problem form, we propose the Improved Elite Genetic Algorithm(IEGA) to obtain a smooth solution of the problem. Numerical results demonstrate the effectiveness of RIS and the proposed joint algorithm for the performance improvement of IoT wireless communication systems. We analyzed the impact of the deployment of RIS and the number of RIS elements on the sum-rate at the receiving devices, which facilitates the balance between the cost and benefit of increasing RIS elements in practical deployments.</p>
<p>TN4313 11:30-11:45</p>	<p>Sequential Single Voting for Cooperative Spectrum Sensing Against Byzantine Attack Jun Wu, Zehao Chen, Haoyu Liang, Ze Chen, Jia Zhang, Jipeng Gan, Jiangtao He Presenter: Zehao Chen, Hangzhou Dianzi University, China</p> <p>Abstract: Cooperative spectrum sensing (CSS) has been a crucial function of cognitive radio (CR) technology to identify the unused spectrum for growing wireless devices and applications. Nevertheless, the openness of CSS paradigm results in that the CR network suffers from Byzantine attack, thereby significantly degrading the CSS performance. To mitigate the adverse effect of Byzantine attack, we conduct out a Byzantine attack model from malicious perspective. Considering that Byzantine attack can make the fusion center (FC) blind, we propose a sequential single voting (SSV) rule to implement the sensing information fusion for CSS. To this aim, a trust value (Trv) mechanism based on interactive evaluation is formulated to measure the reliability of sensing information from secondary users (SUs). Moreover, a pair of tolerance threshold is also taken into account to suppress Byzantine attack, with aiming to make selectively use of sensing information from malicious users (MUs). Meanwhile, we are motivated by the single sign and sequential idea to further enhance the CSS efficiency. In contrast to the existing voting rules, simulation results show that the proposed SSV requires less fewer samples to provide with a better accuracy, especially in the presence of Byzantine attack.</p>
<p>TN4308 11:45-12:00</p>	<p>A Dynamic Task Offloading Strategy for Power Distribution IoT based on Energy Consumption Zhi Li, Di Liu, Xiao Liao, Shiyong Feng, Xueying Ding, Wei Cui Presenter: Zhi Li, State Grid Information & Telecommunication Group Co., Ltd. Beijing, China</p> <p>Abstract: Based on edge computing, wireless communication, and other technologies, the power distribution Internet of Things with edge IoT agent as the core, will realize comprehensive perception, data fusion, and intelligent application of power distribution network, and effectively promote the rapid development of the power grid. However, the power usage efficiency (PUE) of the edge IoT agent is the bottleneck in achieving the distribution network's sustainable computing. The edge IoT agent of power distribution Internet of Things network faces the</p>

problem of green sustainability.

This paper focuses on the computing resource allocation of edge IoT agents in power distribution IoT, designs an energy-efficient green task offloading framework, and proposes an efficient dynamic task offloading strategy. The numerical results show that the task offloading strategy proposed in this paper can ensure the reasonable allocation of power distribution IoT business resources while reducing energy consumption.

Author Presentation Session 4

January 8, 2023 | 13:30-15:45, GMT+8, Beijing Time

SESSION 4 - Information Model Analysis and Image Processing

Session Chair: Assoc. Prof. Wenchen Han, Sichuan Normal University, China

TN1010 TN1017 TN2001 TN1022 TN1030 TN2004 TN1043 TN4314 TN1024

Meeting Link: <https://us02web.zoom.us/j/85654114102>

Password: 010608

TN1010 13:30-13:45	<p>Deterministic Convergence of Backpropagation Algorithm with Cyclic DropConnect for Linear Output Neural Networks Junling Jing, Zaiqiang Wang, Huisheng Zhang Presenter: Junling Jing, Dalian Maritime University, China</p> <p>Abstract: In this paper, we consider the backpropagation algorithm with cyclic DropConnect (BPA-CDC) for neural networks with linear output. Under mild conditions, we establish the deterministic convergence theory for BPA-CDC, showing that the cost function tends to a constant, the gradient tends to zero, and the weight vector tends to a point. Simulation results are provided to validate our theoretical findings.</p>
TN1017 13:45-14:00	<p>Snapshot Ensemble One-dimensional Convolutional Neural Networks for Ballistic Target Recognition Qian Xiang, Xiaodan Wang, Jie Lai, Yafei Song, Jiaying He, Lei Lei Presenter: Qian Xiang, Air Force Engineering University, China</p> <p>Abstract: Aiming at improving the performance of ballistic target HRRP recognition, a ballistic target HRRP recognition method based</p>

	<p>on snapshot ensemble one-dimensional convolutional neural network (SSE-1DCNN) is proposed. The snapshot ensemble model is constructed by integrating a single 1DCNN estimator with a cosine annealing scheduler. The snapshot ensemble integrates 1DCNN estimators at different loss function minima in the same training process, which ensures the diversity of training estimators and avoids the increase in training cost for estimator ensemble. In addition, the AdamW algorithm is introduced to improve the convergence speed and degree of the ensemble training. The experimental results show that the use of snapshot ensemble can effectively improve the recognition of ballistic target HRRP by the 1DCNN, and the introduction of AdamW effectively improves the convergence effect. Compared with a single 1DCNN estimator, the optimal average recognition accuracy of SSE-1DCNN is improved by 0.31% within the hyperparameter experimental setting ranges.</p>
<p>TN2001 14:00-14:15</p>	<p>Remote Traffic Light Detection and Recognition Based on Deep Learning Meng Derong, Teng Zhongmei Presenter: Meng Derong, Shanghai University, China</p> <p>Abstract: As we all know, the signal indicating system of traffic signal lamp plays an obvious role in effectively controlling crossing, ensuring traffic order, guiding traffic flow, improving road capacity and urban traffic stride. Crossing an intersection according to the traffic light is the basic principle of traffic behavior. In real life, the driver may be tired driving or dangerous state of using mobile phone while driving the vehicle, or have the intention to catch the yellow light, so the illegal behavior of crossing the intersection without following the traffic light is still relatively common (especially in China and other developing countries and poor areas). Traffic accidents occur frequently, and intersection is one of the places where traffic accidents occur frequently. At the present stage, this paper mainly studies traffic light detection and recognition based on YOLOv5 model and YOLOv5+DeepSort. The trained model can be used in vehicle system or intelligent recognition field, and it is hoped that when the vehicle approaches or passes through the intersection, it can provide the necessary information for the driver, and can be used for auxiliary driving. Effectively reduce the number of traffic accidents at intersections.</p>
<p>TN1022 14:15-14:30</p>	<p>Towards A Strategy for Developing a Project Partner Recommendation System for University Course Projects Victor Obionwu, Damanpreet Singh Walia, Taruna Tiwari, Tathagatha Ghosh, David Broneske, Gunter Saake Presenter: Chukwuka Victor obionwu, Otto von Guericke Universität Magdeburg, Germany</p> <p>Abstract: Project Partner preferences, and the breakdown of team projects has been a challenge both in industry, and university settings. While the consequence is severe in industrial settings, the loss of time, and invested effort in scenarios where university course project breaks down leads to distrust among members and eventual failure in some cases. Thus, it becomes necessary, the</p>

	<p>acquisition of Colaboratory skills which according to literature is acquired via collaboration with partners whose behaviors cancel out each other's eccentricities. To this end, industry stakeholders have invested enormous resources on the development of user predictive models that optimally predict the outcome of a collaborative engagement. While this strategy is effective, government policies restrict its implementation in institutions of higher learning, thus making collaboration modelling challenging. Ergo, the objective of this endeavor investigation of noninvasive strategies for eliciting individual preferences that affect collaboration and the development of study recommendation partner system. Consequent on the literature review, we have employed a big five-oriented questionnaire input which is passed through a personality based similarity system based on collaborative filtering and utility-based recommendation system. Findings show that generated teams are academically balance which is the main objective of the study recommendation partner system.</p>
<p>TN1030 14:30-14:45</p>	<p>The Analysis of Mobility Patterns During the COVID-19 Pandemic in Thailand Using Time Series Clustering Weeriya Supanich, Suwanee Kulkarineetham, Buddhaporn Vanishkorn Presenter: Buddhaporn Vanishkorn, King Mongkut's Institute of Technology Ladkrabang, Thailand</p> <p>Abstract: The COVID-19 pandemic has affected the lives, health, economics, and travel of all nations, including Thailand. The purpose of this study is to investigate human mobility patterns during the pandemic. We opted to use the public transportation data from January 1st, 2020 until September 28th, 2022 collected from the Ministry of Transport, Thailand as a data source. We conducted a time series study on trend and seasonality patterns, as well as clustering analysis. It can be concluded that public buses and Bangkok electric trains, nationwide state trains and domestic air travel are the two pairs of public transportation with the most similar usage patterns. Moreover, the majority of personal car travel patterns are quite similar to public buses and Bangkok electric trains during some periods.</p>
<p>TN2004 14:45-15:00</p>	<p>A Study of Mental Health Self-monitoring Based on the Combination of BERT and Low-code Platform Tianle Chen, Lei Song, Hua Zhou, Yucheng Li, Hongwei Wang, Chuang Kong Presenter: Tianle Chen, Southwest Forestry University, China</p> <p>Abstract: This paper proposes a technical route for mental health self-monitoring based on BERT. This route can facilitate models that achieve good results on many tasks of natural language processing and can excellent in analyzing the emotions of the recorders. At the same time, the low-code platform, as an auxiliary system tool for software engineering, is able to deploy some machine learning tasks, including data preparation, storage, model building, etc., therefore, it used in this experiment to assist language models for sentiment analysis. With the combination of the two techniques, the accuracy of this technological route to facilitate sentiment analysis can reach</p>

	<p>up to 88.32%. And by reminding the changes in the emotions of the recorder, it can initially achieve the purpose of achieving mental health selfmonitoring.</p>
<p>TN1043 15:00-15:15</p>	<p>Hazardous Behavior Identification Based on BIM and AutoML Applied to Prefabricated Construction Nairui Hou Presenter: Nairui Hou, Weifang University, China</p> <p>Abstract: With the continuous development of China's construction projects, safety hazards have emerged endlessly. Safe and standard construction practices are essential in construction projects. In recent years, construction safety accidents caused by construction workers not wearing helmets correctly and safety accidents caused by workers smoking and igniting flammable materials to start site fires have accounted for a large proportion of the safety accidents that have occurred on major construction sites. However, traditional manual supervision is time-consuming, inefficient, subjective, and sometimes challenged by conflicts of interest. Over the years, deep learning-based target object detection has achieved satisfactory results, but the complex deep learning setup is not easily mastered by construction personnel. Therefore, it is of great practical importance to prevent and reduce construction safety accidents by automatically detecting behavioral norms for personnel entering job sites. To this end, this paper presents an automatic machine learning (AutoML) framework for helmet detection and smoking recognition. This paper aims to benchmark the AutoML algorithm for helmet detection and smoking. The final results of the experiments show that for helmets, AutoML could achieve 99.0% precision, 91.89% recall, and 99.24% mAP, which demonstrates the usability of AutoML in the construction datasets.</p>
<p>TN4314 15:15-15:30</p>	<p>Prediction of Ship Motion Attitude Based on Combined Model Xingyuan Liu, Xiandeng He, Yunhui Yi Presenter: Xingyuan Liu, Xidian University, China</p> <p>Abstract: Due to the influence of sea conditions, six dimensional movements, including heave, roll, pitch, sway, pitch and yaw, are easy to be produced while ships sailing. These motions seriously affect the safety of its sailing, so the prediction of ship motion attitude is particularly important. In this case, a new combined model called CWGRU is proposed for predicting ship motion attitude with high accuracy. The CWGRU is based on complete ensemble empirical mode decomposition algorithm (CEEMD), whale optimization algorithm (WOA) and gated recurrent unit (GRU). Firstly, the CEEMD algorithm is used to decompose the ship's sailing attitude data into a number of intrinsic mode functions (IMF) with different characteristics, so that the non-stationary time sequences have stability and periodicity. Then, the GRU based on WOA (WGRU) model is used to learn the short-term characteristics of each IMF component and predict it. Finally, the predicted values of each IMF component are added to obtain the prediction results. In order to verify the</p>

	<p>effectiveness of the CWGRU model proposed in this paper, the experiment based on real motion data collected in a ship are carried out. The first 80% of the data is used as the training set, and the last 20% is used for the test. Experimental results show that the performance of CWGRU is much better than that of GRU and WGRU.</p>
<p>TN1024 15:30-15:45</p>	<p>Semantic Relatedness: A Strategy for Plagiarism Detection in SQL Assignments Chukwuka Victor Obionwu, Rahul Kumar, Suhas Shantharam, David Broneske, Gunter Saake Presenter: Chukwuka Victor obionwu, Otto von Guericke Universität Magdeburg, Germany</p> <p>Abstract: The Structured Query Language is the de facto language for defining, and manipulating data in a relational database. Thus, its mastery is important for students in computer science related discipline. Ergo, most universities offer more different courses that enable students to acquire SQL skill. However, this objective is plagued by code plagiarism, a major problem affecting the academic community. While plagiarism detection in other languages are detectable, detecting copied code in SQL is a difficult task to solve as most of the queries are relatively same, which makes plagiarism detection strategies ineffective when the objects are SQL queries. Research efforts in natural language processing has seen the development of several strategies that has facilitated complex evaluation of text strings. In this endeavour, we leverage semantic similarity, a method that enables the evaluation of the semantic textual similarity between text strings, and the idea of distance between words, and the likeliness of their meaning to detect plagiarised SQL queries by semantically evaluating raw student query submissions from our SQL courses which are offered every semester. Result show that the semantic similarity strategy was able to detect code similarity, which translated to plagiarism in a considerable umber of submissions. In all, we describe in this paper, our plagiarism detection strategy, the limitations of our strategy, possible means that may be effective at addressing these limitations.</p>

Author Presentation Session 5

January 8, 2023 | 16:00-18:15, GMT+8, Beijing Time

SESSION 5 - Sensing and Computing in the Communication System

Session Chair: Assoc. Prof. Sanshan Sun, Sichuan Normal University, China

TN4311 TN1028 TN1044 TN1048 TN4415 TN4417 TN1001 TN1051 TN1049

Meeting Link: <https://us02web.zoom.us/j/85654114102> Password: 010608

Rate Optimization and Interference Suppression in RIS-assisted MIMO Systems
Junwei Chai, Yunhui Yi, Xiandeng He, Zicheng Xing, Yuanxinyu Luo, Xingcai Zhang
Presenter: Junwei Chai, Xidian University, China

TN4311
16:00-16:15

Abstract: Since the beginning of the modern era of wireless communication, the propagation medium has been considered a randomly behaving entity between transmitter and receiver, which degrades the quality of the received signal due to the uncontrollable interaction between the transmitted radio waves and the propagation medium. Reconfigurable intelligent surfaces (RIS) represent a new technology that can overcome the adverse effects of the natural wireless environment. Reconfigurable intelligent surfaces can be used to shape the propagation of radio waves in wireless networks by adjusting the switch and phase shift. In industrial production environments, the spacing between multiple devices is usually small and susceptible to interference due to limited indoor space. The presence of RIS provides the possibility for different communication needs between multiple devices. This paper proposes a multi-objective optimization method based on non-dominated sorting genetic algorithm II(NSGAI) to improve the achievable rate of communication users while reducing interference to non-communication users.

<p>TN1028 16:15-16:30</p>	<p>Optimal Game Routing for UAV Adhoc Networks in Smart City Saifullah¹, Zhi Ren^{*1}, Khalid. H Mohammadani², Waqar Riaz¹ Presenter: Saifullah, Chongqing University of Posts and Telecommunications</p> <p>Abstract: Unmanned Aerial Vehicular networks play a vital role in future wireless networks due to their flexible network architecture. UAVs are deployed in the military operation, live streaming of events, agriculture farming and the internet of things in smart cities. The UAV adhoc networks are at their initial stages due to unique challenges such as high mobility and , 3D mobility leads to the unstable topology. To tackle this issue position-based routing schemes were introduced to offer high throughput and reduce packet overhead. Though offering many benefits, position-based routing schemes offers higher delay due to the absence of routing table information. To counter this problem, we have proposed Optimal Game Routing Protocol in which each UAV gets position information of next hope UAV node as well as its neighbouring position. Moreover, we have formulated a game theory function which takes eigenvector centrality, total energy and delay as key measures to select the next hop. To evaluate the efficiency of the proposed scheme, we have compared our scheme with benchmark schemes. Results show OGR outer performs on different load scenarios.</p>
<p>TN1044 16:30-16:45</p>	<p>Stackelberg Game Based Resource Allocation Algorithm for Federated Learning in MEC Systems Xiongyan Tang, Yue Wang, Rong Huang, Gao Chen, Liwen Wang Presenter: Yue Wang, Beijing University of Posts and Telecommunications, China</p> <p>Abstract: Introducing Federated Learning (FL) into the mobile edge computing (MEC) system can effectively deal with delay-sensitive tasks and protect end devices (EDs) data privacy. In the process of participating in FL, the EDs will carry out a large number of local iterations and multiple rounds of communication with the MEC server to achieve a target model accuracy. These will bring delay and energy cost which may reduce EDs' willingness to participate. In this paper, a resource allocation algorithm considering EDs incentives is proposed. We model the resource allocation of the MEC server and EDs as a two-layer Stackelberg game model and design two-layer utility functions. In EDs layer, we provide rewards to incentive EDs to contribute computing resource to achieve higher local model accuracy and weigh it against energy consumption of ED. In MEC server layer, the tradeoff between global model accuracy and system delay is conducted. We take utilities maximization as the optimization objective, and optimize the number of local iterations and bandwidth of EDs to achieve joint computing and communication resource allocation in the MEC system. Then, according to the solution of the optimization problems, we propose a resource allocation algorithm. Finally, the simulation results show that the proposed algorithm is superior to the benchmark schemes in reducing EDs' energy consumption and system delay, which can achieve the purpose of encouraging EDs to participate.</p>

<p>TN1048 16:45-17:00</p>	<p>Automotive Mixed Criticality DAG Function scheduling Optimization based on Edge Computing Tianyu Wang, Yuan Zou, Xudong Zhang, Jiahui Liu, Jinming Wu Presenter: Tianyu Wang, Beijing Institute of Technology, China</p> <p>Abstract: As the high level autonomous vehicle has come to be regarded as the typical mixed-criticality cyber-physical system, the optimization approach of job scheduling has drawn more and more attention. When the conventional mixed-criticality theory is used to handle the scheduling problem, the low criticality functions are frequently degraded or abandoned at high system criticality levels, decreasing service satisfaction. This paper proposes an optimization method using edge computing to improve the performance of low criticality functions on the presumption that high criticality functions can meet the deadline requirements. The optimization method is based on the scenario of the future prospect of intelligent transportation and the new electronic/electrical information architecture of network connection. This research also provides some mixed-criticality function models to validate our methods. Weighted completion index is proposed to measure the scheduling effect of this situation, which also quantifies the level of improvement of edge computing-based scheduling over the conventional local scheduling method, in order to address the lack of evaluation of passengers' perception when vehicle soft real-time DAG functions are unable to meet the deadline.</p>
<p>TN4415 17:00-17:15</p>	<p>Design of Border Security System based on Ultrasonic Technology and Video Linkage Youcheng Liang, Haitao Chen Presenter: Youcheng Liang, Guangzhou Civil Aviation College, China</p> <p>Abstract: An intelligent border system measurement scheme based on ultrasonic sensing technology is designed in this paper. The measurement scheme is composed of the sensing detection module and the data processing module, where the main sensing detection module is the outdoor sensor probe, which is mainly composed of the network controller, the network management module, the sensor and the sensor interface. The system measurement scheme mainly uses ultrasonic sensors and intelligent video for comprehensive perception of the perimeter area. Signal detection is completed through signal acquisition, analysis and processing of the detection area, and then through computer data processing, through intrusion positioning, so as to realize the all-weather intelligent monitoring of the perimeter area.</p>
<p>TN4417 17:15-17:30</p>	<p>Optimizing the Number and Size of Signature Cells in a Modulated Sensor System Alina Olteanu Presenter: Alina Olteanu, University of Montevallo, United States</p>

	<p>Abstract: The localization and tracking capabilities of binary sensors can be significantly enhanced by associating sensor nodes with modulators. The addition of modulators segments the detection area into subregions, called signature cells. While much of the related research focuses on modulator design and sensor data processing, there are few studies on the optimum number of cells, especially when considering small area cells with small area variances. This paper studies the optimum number of cells for varying numbers of per-sensor modulators under a placement scenario that produces signature cells with small area variances. We first derive the optimum number of signature cells and find necessary and sufficient conditions under which the maximum is achieved. We then focus on the sensors' spatial awareness and deduct the conditions under which maximal spatial awareness is achieved. Finally, we study the asymptotic behavior of the individual cells' areas in terms of the number of modulators. Our study can guide researchers in enhancing the tracking and localization precision of applications and improve the spatial awareness of sensors.</p>
<p>TN1001 17:30-17:45</p>	<p>A Framework for Decoupling Overlay SDN and Computing Virtualization Baohong Lin, Linze Wu, Zhilan Huang, Yi Liu, Yangchun Li, Yongbin Fan Presenter: Baohong Lin, China Telecom Research Institute, China</p> <p>Abstract: When enterprise introduces different vendor overlay SDN (Software defined Networking) and computing virtualization in cloud data center, they will face the problem of interoperability. To solve this problem, this paper proposes a framework for decoupling heterogeneous overlay SDN and computing virtualization. The framework has two key elements, that is, the VM (Virtual Machine) lifecycle event mechanism and drainage mechanism based on VM-Type NVE (Network virtualization Edge). VM life cycle event mechanism realizes the synchronization of VM life cycle events among cloud management platform, SDN and computing virtualization. The drainage mechanism realizes the accurate traffic forwarding between business VMs. Test results show that the framework is suitable for enterprise to build a heterogeneous and compatible cloud infrastructure.</p>
<p>TN1051 17:45-18:00</p>	<p>Research on Key Technologies of High Precision Millimeter Wave Radar Ranging System Wenzhe Gu, Botao Feng, Xiaoye Wang, Xuzhi Zou Presenter: Wenzhe Gu, Huizhou University, China</p> <p>High precision measurement technology has a wide range of applications in the field of industrial engineering, such as solid and liquid level measurement, detection of small defects on highly smooth metal surfaces, etc. But, accuracy of traditional measurement technology is difficult to reach the millimeter level. Based on the introduction of basic principle of FMCW radar, this paper analyzes the key technologies of high-precision radar ranging system. Related works are studied, which focuses on millimeter wave antenna,</p>

	integrated circuit, and digital signal processing algorithm. At last, the future directions and outlook are prospected.
<p>TN1049 18:00-18:15</p>	<p>Sum Rate Maximization for UAV Assisted NOMA Backscatter Communication System Xueqing Gan,Yuke Jiang, Yufan Wang, Duan Hong, Zhengqiang Wang Presenter: Xueqing Gan, Chongqing University of Posts and Telecommunications, China</p> <p>In this paper, we study a sum-rate maximization resource allocation algorithm for an unmanned aerial vehicle (UAV) assisted non-orthogonal multiple access (NOMA) backscatter communication system. Considering the energy collection time, gateway amplification factor, and UAV position constraints, sum rate maximization resource allocation model is established. Since the proposed problem is a non-convex problem that is difficult to solve directly, the original problem is decomposed into three subproblems using block coordinate descent (BCD) method to design efficient iterative algorithm to achieve the final sum-rate maximization. Simulation results show that the algorithm has better performance than the benchmark algorithms.</p>

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