IEEE ComSoc Technical Committee on Cognitive Networks (TCCN)

https://cn.committees.comsoc.org/

Chair: Shiwen Mao

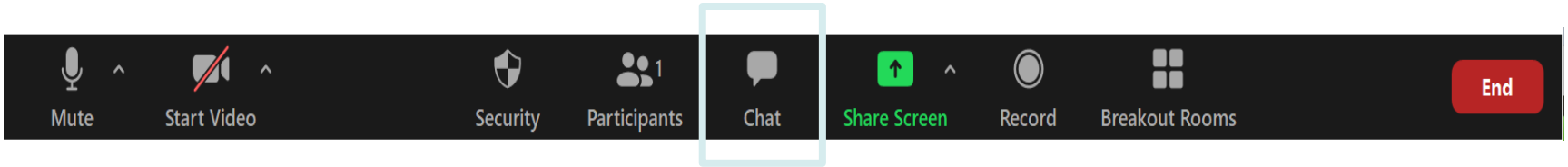
smao@auburn.edu

Auburn University, USA

IEEE Globecom 2023, Dec. 5, 2023

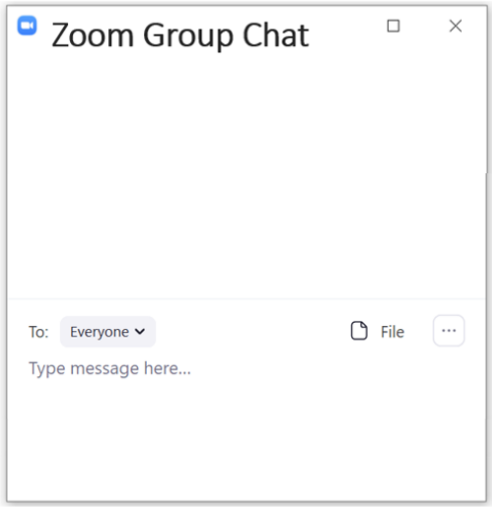
Roll Call

- In-person: please sign the sign-up sheet (name, affiliation, email)
- Remote:
  - Find and click “Chat” icon at the bottom of Zoom meeting interface



  - Type your information in the chat box:

Your Name + Your Email



Agenda

1. **Welcome**
2. **Roll Call**
3. **Approval of the Agenda**
4. **Approval of the ICC 2023 (May 2023) TCCN meeting minutes**
5. **Introduction and Report from the Chair**
6. **TCCN Recognition/Publication Awards**
7. **TCCN Webinars and Journal Collaboration**
8. **TCCN Standardization Activities**
9. **Reports on Special Interest Groups (SIGs)**
10. **Reports on Publications**
11. **Reports on Conferences**
12. **TCCN Publicity**
13. **Next TCCN Meeting**
14. **Open Discussions**
15. **Invited Talks**

Meeting at IEEE ICC 2023 [Online]

Date and Time: Tuesday, May 2nd, 2023 09:00 AM EDT (US and Canada)
Venue: Zoom (online video conferencing platform) [recording (pwd: j4jJJs.f)]

Agenda

1. Welcome and Introduction
2. Attendance Register
3. Approval of the Agenda
4. Approval of the GLOBECOM 2022 (Nov. 2022) TCCN meeting minutes
5. Reports from the Chair, **Shiwen Mao** (Auburn University, USA) (Download Slides)
6. Reports on TCCN Nominations, by **Shiwen Mao**(Auburn University, USA)
7. Reports on TCCN Awards and Subcommittee, by **Lingyang Song** (Peking University, China)
8. Reports on TCCN Webinars and Journal Collaborations, by **Shiwen Mao**
9. Reports on Special Interest Groups (SIGs)
    1. SIG on Sensing, Communications, Caching, and Computing (C^3) in Cognitive Networks, by **Yongpeng Wu** (Shanghai Jiaotong University, China) (Download Slides)
    2. SIG on AI and Machine Learning in Security, by **K.P. (Suba) Subbalakshmi** (Stevens Institute of Technology, USA) (Download Slides)
    3. SIG on AI Empowered Internet of Vehicles, by **Ning Lu** (Queen's University, Canada) (Download Slides)
    4. SIG on Wireless Blockchain Networks, by **Jiawen Kang** (Guangdong University of Technology, China) (Download Slides)
10. Reports on conferences (Download Slides)
    1. ICC 2023 Cognitive Radio and AI-Enabled Networks Symposium, by Lei Zhang (University of Glasgow, UK)
    2. GLOBECOM 2023 Cognitive Radio and AI-Enabled Networks Symposium, by Hongliang Zhang (Peking University, China)
    3. Nominations for ICC 2024, GLOBECOM 2024, and ICC 2025
11. Reports on publications
    1. IEEE Transactions on Cognitive Communications and Networking, by **Shiwen Mao** (Download Slides)
12. TCCN Publicity
    1. Report on website, by **Hongliang Zhang** (Download Slides)
13. TC Restructure Report, by **Shiwen Mao** (Download Slides)
14. TC Innovation Project, by **Shiwen Mao**
15. TC Campaign Video Project, by **Shiwen Mao**
16. Next TCCN Meeting, by **Shiwen Mao**
17. Any other business, **all**

Minutes of the Meeting

Download minutes

Download attendance

TCCN Officers (2023-2024)

- **Chair**
  - Shiwen Mao, Auburn University, USA
- **Vice-Chairs**
  - Yuan Ma, Shenzhen University, China (Asia Pacific)
  - Yuanwei Liu, Queen Mary University of London, UK (Europe/Africa)
  - Ning Zhang, University of Windsor, Canada (Americas)
- **Secretary**
  - Hongliang Zhang, Peking University, China
- **Standards Liaison**
  - R. Venkatesha Prasad, Delft University of Technology, Netherlands
- **Publicity Board**
  - Hongliang Zhang, Peking University, China
- **Student Competition Program**
  - Kaoru Ota, Muroran Institute of Technology, Japan
  - Boya Di, Peking University, China

Introduction

- TCCN Goals
  - Technical Committee on Cognitive Networks (TCCN) is to provide a platform for its members in particular, and the *cognitive and artificial intelligence (AI) enabled networking research*, development, policy making and standardization community in general, to interact and exchange technical ideas to identify major challenges and also drive solutions in the development of AI-enabled networking technologies.
- Technical Scope
  - Spectrum agile/dynamic spectrum access networks, related issues from PHY to application layers, security and privacy issues, policy issues, implementation technologies (e.g., embedded AI, software radio, middleware), economic considerations and standardization activities.

TCCN membership

- **Joining TCCN**
  1. The TCCN mailing list
     ① The TCCN mailing list is reserved for the **most important TC announcements**
     ② To subscribe to the mailing list, please visit *https://cn.committees.comsoc.org/mailing-list/*
  2. ComSoC Group
     ① Go to *http://community.comsoc.org/*, and create your account by your email address (you can directly use your current IEEE account credentials).
     ② Log in and choose "TC Cognitive Networks" as "My Groups"

- **Active Membership**
  - Anybody can be a member of the TCCN. To become a member, it is necessary to **subscribe** to the TCCN mailing list
  - A member becomes an **Active Member** if he/she has attended (physically present or by teleconference) **TWO** or more of the prior **five** regularly scheduled TCCN meetings

Attendance Online Meeting July 2021	Attendance Online Meeting Nov 2021	Attendance Online Meeting Apr 2022	Attendance Online Meeting Nov 2022	Attendance Online Meeting May 2023
60	51	44	66	65

How to Get Involved in TCCN

- **Many ways of getting involved**
  - Participate in existing, or create new Special Interest Groups (SIGs)
  - Organize special issues for the TCCN Newsletter
  - Participate in TCCN related standardization efforts
  - Contribute to the publicity efforts of TCCN
  - Contribute to student competition program
  - Represent TCCN in ComSoc conference organization
  - Represent TCCN in ComSoc journal special issues
  - …
- **TC will reward excellent volunteers through various nominations and endorsements**
  - Awards, elevation to senior/fellow, distinguished lecturer, ICC/GC symposium co-chair, …

TCCN Special Interest Groups (SIGs)

- **What is a SIG?**
  - SIGs are mini-TC, representing the hot and emerging research areas in the general field of cognitive networks
- **What does a SIG do?**
  - Attract submissions to CRN symposium at ICC and GLOBECOM
  - Organize journal special issues for TCCN and others
  - Organize workshops and conferences
  - Organize other related technical activities (conference call, blogs, etc.)
- **Who are in a SIG?**
  - Leadership team: a Chair, one or more Vice-Chairs, one or more advisors
  - 10+ key members
  - Considering geographical and academia/industry balance
- **How to establish a SIG?**
  - Fill in the form with the proposed SIG team and activities http://cn.committees.comsoc.org/special-interest-groups-sigs/application-for-special-interest-groups/
  - Send to TC Chair
  - Usually go through 1-2 rounds of feedback before official approval

Current Status of TCCN SIGs

- **Active SIGs**
  - SIG on AI and Machine Learning in Security (K.P. (Suba) Subbalakshmi)
  - SIG on Sensing, Communications, Caching, and Computing $\boldsymbol{C^3}$ in Cognitive Networks (Li Wang)
  - SIG on AI Empowered Internet of Vehicles (Ning Lu)
  - SIG on Wireless Blockchain Networks (Zehui Xiong)

- **Inactive SIGs**
  - SIG on Cognitive Network for 5G
  - SIG on Data-Driven Cognitive Networks
  - SIG on AI Embedded Cognitive Networks
  - SIG on Cognitive Communications and Networking in Cyber-Physical Systems
  - SIG on Energy-harvesting Cognitive Radio Networks

TCCN Newsletter

- TCCN Newsletter is a bi-annual electronic platform dedicated to excel in the following aspects:
  - Introducing forward-looking research ideas
  - Updating members on new industry, standard, and policy initiatives
  - Promoting top-quality publications with high potential impacts
  - Increasing the visibility of TCCN within ComSoc and beyond
- Latest edition of the TCCN Newsletter by newsletter Director Dr. **Dola Saha**, Dec. 2023
- Call for new ideas and contributions to future newsletters

also interviewed five renowned scholars, Prof. Ying-Chang Liang, Prof. Sofie Pollin, Prof. Bhaskar Krishnamachari, Dr. Nada Golmie and Prof. Josep Jornet. They have all shared their insights for future cognitive communication systems and the challenges ahead of us in tackling those topics.

I would like to sincerely thank all the contributors for taking the time to share their thoughts with the readers of the TCCN newsletter in their busy schedule. I hope all of you will cherish reading the articles and interviews as I did.

Sincerely,

Dola Saha
Director, IEEE ComSoc TCCN Newsletter
Associate Professor
Department of Electrical & Computer Engineering
University at Albany, SUNY
Email: *dsaha@albany.edu*
URL: *https://www.albany.edu/faculty/dsaha/*

2. Newsletter Director's Note

Dear Fellow TCCN Members:

It is my extreme honor and great pleasure to introduce the newsletter that highlights recent progress in cognitive communication as well as thought-provoking new avenues of future research and challenges in the field from world class leaders.

We have come across a long way since Marconi first demonstrated wireless communication in 1894. Over a century later, we are still working on wireless communication to support high bandwidth low latency emerging applications, like virtual reality, telesurgery, 3D holographic communication, etc. and ubiquitous connectivity for exponentially growing number of devices. To support the demand arising from all these scenarios, it is essential to critically rethink the communication systems to not only make the radios to be cognitive, but the end-to-end links and networks to be smart, autonomous and capable of reasoning for a resilient system. Cognitive communication is undergoing a major shift in paradigm from only classical signal processing based methods to various data driven approaches that have been shown to perform better than prior methods. However, due to the black-box nature of learning based methods and high dependency on training data set, practical adoption is still sparse specially in critical applications. This is precisely where the data driven learning models can be improved with physics based domain knowledge that can make the systems explainable, predictable, adaptable and enhanced with causal reasoning. The future of cognitive communication lies in the confluence of signal processing and machine learning based approaches, reaping the benefits of both the domains towards a lifelong learning without catastrophic forgetting.

In this newsletter, we have two visionary articles, one from Dr. Tim O'Shea and the other from Prof. Gunes Karabulut Kurt. Dr. O'Shea's article shows various pathways for scalable systems using data driven models. Prof. Kurt's article delves into the topic of cognition in space communication, which is getting crowded at an extremely fast pace. We have

Dola Saha is an Associate Professor in the Department of Electrical & Computer Engineering at University at Albany, SUNY. She co-directs the Mobile Emerging Systems and Applications (MESA) Lab at UAlbany. She was a faculty fellow at Jet Propulsion Laboratory, Caltech, NASA in summer of 2022. She was a visiting faculty at the Air Force Research Laboratory in summers of 2020 and 2021. She is the Vice Chair of the IEEE ComSoc TCCN SIG for AI and Machine Learning in Security and has been appointed a member of the SUNY Innovations Policy Board. Prior to that, she was a Research Assistant Professor in the Department of Electrical & Computer Engineering at Rutgers University. Before that, she was a Researcher in the Mobile Communications and Networking group at NEC Laboratories America. She received Best Paper Award in DySPAN 2015 and 2021. She received her Masters and Doctorate degrees from the Department of Computer Science in the University of Colorado Boulder. She is the recipient of Google Anita Borg Scholarship for her academic credentials. Her research interests lie in the crossroads of Machine Learning for Wireless Communication, Wireless Security, Wireless Signal Processing, and Architectures of Software Defined Radios with focus on systems design and practical evaluation.

Dec. 2023 Issue: Visionary Articles

- **Data is Accelerating Communications Technology**

Author: Dr. Tim O'Shea,
CTO DeepSig Inc.,
Research Assistant Professor, Virginia Tech,
Arlington, VA, USA, USA,
Email: *tim@deepsig.ai*

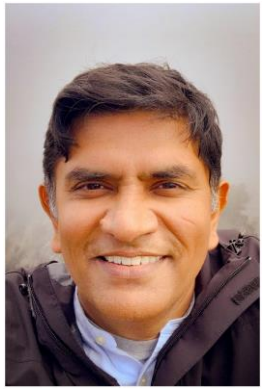
- **On the Necessity of Cognitive Capabilities in New Space**

Author: Prof. Gunes Karabulut Kurt,
Department of Electrical Engineering,
Polytechnique Montréal
Montreal, Canada
Email: *gunes.kurt@polymtl.ca*

Dec. 2023 Issue: Interviews

Prof. Ying-Ching Chang
University of Electronic Science and Technology of China

Prof. Sofie Pollin
KU Leuven, Belgium



Prof. Bhaskar Krishnamachari
University of Southern California, USA

Prof. Nada Golmie
National Institute of Standards and Technology (NIST), USA

Prof. Josep Jornet
Northeastern University, USA

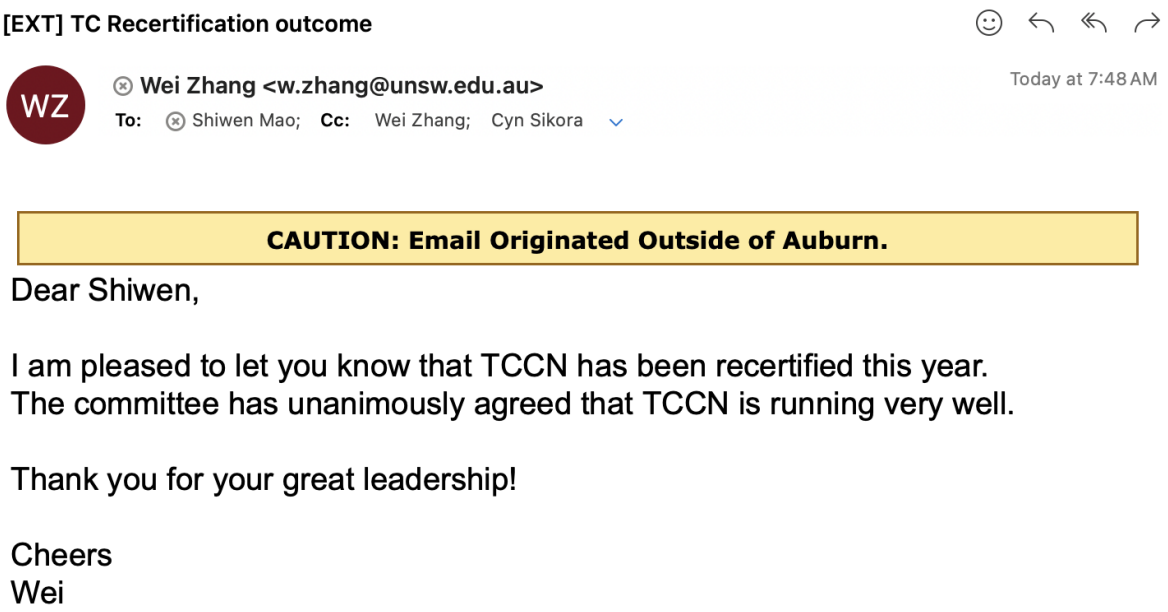
- Most impactful topic for future research
- Challenges in each of those topics
- Short discussion on exciting new research
- Academia, Industry and Government collaboration
- Community Engagement

Nominations for Symposium Co-chairs for IEEE GC 2025

- TCCN is the primary sponsor of the *ICC/GC Symposium on Cognitive Radio and AI-enabled Networks* (CRAEN)
  - Can nominate up to 3 candidates, for CREAN and other related symposia
- Call for nominations
  - To: Shiwen Mao (smao@ieee.org) and Hongliang Zhang (hongliang.zhang@pku.edu.cn)
  - Including the following information in a single PDF file
    - Your name, affiliation, contact information, bio and website, ComSoc Member Number
    - A ranked list of up to 3 symposia or tracks that you want to chair
    - A list of all prior ICC/GLOBECOM symposia chaired or comparable experiences in other major conferences
    - Your past experience/contributions to TCCN
    - Your commitment of time/efforts, and your plans to increase submissions to the Cognitive Radio & AI-Enabled Networks Symposium
  - Reviewed and selected by TCCN officers (preference to Active Members)
- Nominations for GC 2025:
  - Boya Di, Peking University, China
  - Yulei Wu, University of Bristol, UK
  - Chee Wei Tan, Nanyang Technological University, Singapore

TC Recertification

- Each ComSoc TC will be recertified every three years
- Review of TC activities:
  - Number of members, TC meeting attendance, conference, journal, seminar/talks, newsletter, member elevation, awards, standardization, SIGs, ...
- TCCN's turn: review documented submitted in Fall 2023
- Result:



[EXT] TC Recertification outcome

WZ

Wei Zhang <w.zhang@unsw.edu.au>

Today at 7:48 AM

To: Shiwen Mao; Cc: Wei Zhang; Cyn Sikora

CAUTION: Email Originated Outside of Auburn.

Dear Shiwen,

I am pleased to let you know that TCCN has been recertified this year.
The committee has unanimously agreed that TCCN is running very well.

Thank you for your great leadership!

Cheers
Wei

TC Innovation Project

- **Purpose:** To incubate, nourish, and grow breakthrough innovations in communications technologies, this project aims to offer incentive fund to Technical Committees (TC), Special Interest Group (SIG), and Emerging Technologies Initiatives (ETI) to provide original and revolutionary ideas, concepts, techniques, methods and solutions that may lead to the breakthrough in communications technologies

- **How:**
  - $50,000 has been approved by the BoG in Dec. 2022
  - Up to 10 proposals will be selected from TC/SIG/ETI submitted proposals, and each selected proposal will be funded by $5,000
  - Supported expenses include travel, support for organizing workshop, seminar, etc.

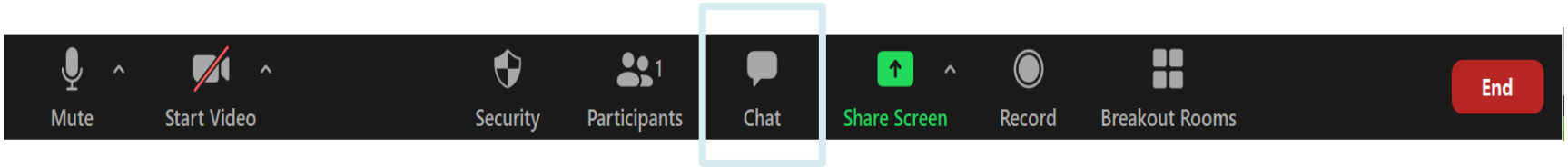
- **TCCN is among the 8 funded projects**
  - Led by Dr. Boya Di
  - Seminars to promote new technologies of TCCN interest
  - Cohost the event at GC'23 TCCN meeting
  - Two invited talks:
    - "Distributionally Robust Optimization and Machine Learning for Communication Networks"
      By Dr. **Zhu Han**, ECE Department and CS Department, University of Houston
    - "Reconfigurable Holographic Surfaces: A New Paradigm to Ultra-Massive MIMO for 6G"
      By Dr. **Lingyang Song**, School of Electronics, Peking University, China

TC Video Campaign

- **Purpose**: to make our members and the public aware of what our technical committees are doing and how they guide the high-interest initiatives in communication technology
- **How**:
  - Make one short video about 1-2 minutes for each TC. Finally, 3 or 5 best videos will be selected among 26 TCs for the TC Video Award
  - Work with ieee.tv and IEEE Media Center
  - Introduction of your TC, interviews with TC members, new technologies, classic papers, ill …
- **TCCN is among the 5 funded projects**
  - Led by Dr. Hongliang Zhang
  - Funding of $1,000
  - Working with ieee.tv on producing the short video
  - Let us know if you have any ideas or like to get involved in this project

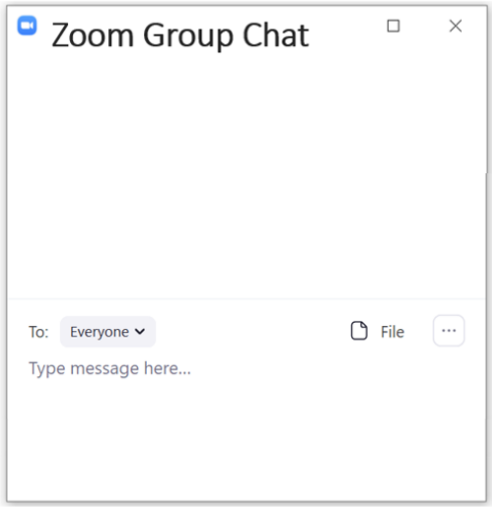
Roll Call

- In-person: please sign the sign-up sheet (name, affiliation, email)
- Remote:
  - Find and click “Chat” icon at the bottom of Zoom meeting interface



  - Type your information in the chat box:

Your Name + Your Email



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IEEE ComSoc TCCN Recognition Award Committee

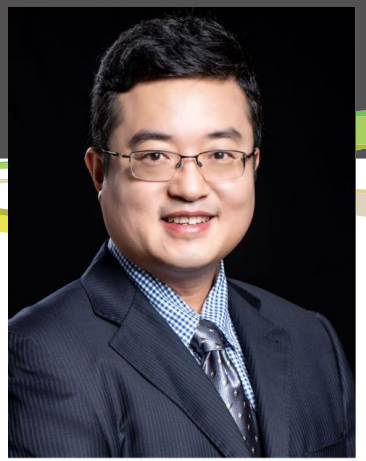
TCCN Recognition Award Sub-committee (2023)

- **Chair:**
  - Lingyang Song, Peking University, China

- **Members:**
  - Marco De Renzo, Paris-Saclay University, France
  - David Grace, University of York, UK
  - Yingchang Liang, University of Electronic Science and Technology, China
  - Angela Yingjun Zhang, Chinese University of Hong Kong, China

- **Deadline:** Sept. 30th, 2023

IEEE ComSoc TCCN Recognition Award



The IEEE Technical Committee on Cognitive Networks is proud to present the TCCN Recognition Award to

Prof. Rui Zhang

"For Outstanding Contributions to Cognitive Radio and Spectrum Sharing Communication Systems"

Dr. Rui Zhang is a Principal's Diligence Chair at the Chinese University of Hong Kong, Shenzhen. Prior to that, he was appointed as a Provost's Chair Professor at National University of Singapore. His current research interests include UAV/satellite communication, wireless power transfer, intelligent reflecting surface and reconfigurable MIMO, optimization methods, etc. He has been listed as a Highly Cited Researcher by Thomson Reuters/Clarivate Analytics since 2015. He received 14 IEEE Best Paper Awards, including the IEEE Marconi Prize Paper Award in Wireless Communications in 2015 and 2020, the IEEE Signal Processing Society Best Paper Award in 2016, the IEEE Communications Society Heinrich Hertz Prize Paper Award in 2017, 2020 and 2022, the IEEE Communications Society Stephen O. Rice Prize in 2021, etc. He is a Fellow of the IEEE and the Academy of Engineering, Singapore.

IEEE ComSoc TCCN Recognition Award

IEEE ComSoc TCCN Publication Award Committee

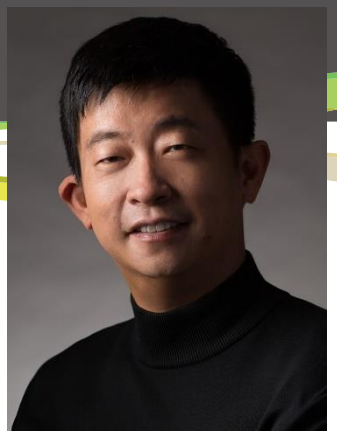
TCCN Publication Award Committee (2023)

- **Chair:**
  - Lingyang Song, Peking University, China

- **Members:**
  - Yusheng Ji, National Institute of Informatics, Japan
  - Petar Popovski, Aalborg University, Denmark
  - Dusit Niyato, Nanyang Technological University, Singapore
  - Jianwei Huang, Chinese University of Hong Kong (Shenzhen), China

- **Deadline:** Sept. 30th, 2023

IEEE ComSoc TCCN Publication Award



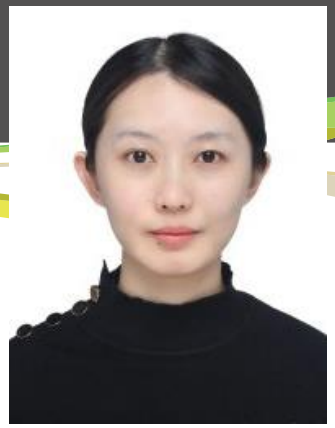
The IEEE TCCN is proud to present the TCCN Publication Award to

Prof. Zhu Han

"For Outstanding Contributions to Efficient Wireless Sensing and Spectrum Management Enabled by Large-scale MIMO"

Zhu Han is a John and Rebecca Moores Professor in the Electrical and Computer Engineering Department as well as in the Computer Science Department at the University of Houston, Texas. His research interests include wireless resource allocation and management, wireless communications and networking, quantum computing, data science, smart grid, security and privacy. Dr. Han received an NSF Career Award in 2010, the Fred W. Ellersick Prize of the IEEE Communication Society in 2011, the EURASIP Best Paper Award for the Journal on Advances in Signal Processing in 2015, IEEE Leonard G. Abraham Prize in the field of Communications in 2016, and several best paper awards in IEEE conferences. Dr. Han was an IEEE Communications Society Distinguished Lecturer from 2015-2018, AAAS fellow since 2019, and ACM distinguished Member since 2019. Dr. Han is a 1% highly cited researcher since 2017 according to Web of Science. Dr. Han is also the winner of the 2021 IEEE Kiyo Tomiyasu Award (an IEEE Technical Field Award.

IEEE ComSoc TCCN Publication Award



The IEEE TCCN is proud to present the TCCN Publication Award to

Prof. Boya Di

"For Outstanding Contributions to Efficient Wireless Sensing and Spectrum Management Enabled by Large-scale MIMO"

Boya Di obtained her Ph.D. degree from the Department of Electronics, Peking University, China, in 2019. Prior to that, she received the B.S. degree in electronic engineering from Peking University in 2014. She was a postdoc researcher at Imperial College London and is now an assistant professor at Peking University. Her current research interests include holographic radio, reconfigurable intelligent surfaces, multi-agent systems, edge computing, and aerial access networks. She is the recipient of 2021 IEEE ComSoc Asia-Pacific Outstanding Paper Award and 2022 IEEE ComSoc Asia-Pacific Outstanding Young Researcher Award. She serves as an associate editor for IEEE Transactions on Vehicular Technology, IEEE Communications Surveys & Tutorials, and IEEE Internet of Things Journal.

IEEE ComSoc TCCN Publication Award

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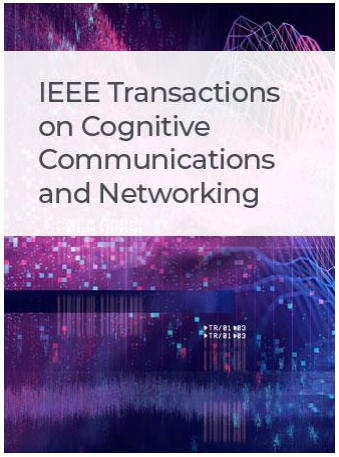
TCCN Webinars

- TCCN webinar series: four webinars per year
- Virtual Seminar Series organized by the TCCN AIMLSec-IG
- Webinars in 2023:
  - [11/23] Learning Scheduling and Optimization in Federated Edge Learning – Dr. Yu Wang, Temple University, USA
  - [09/23] RingSFL: An Adaptive Split Federated Learning Towards Taming Client Heterogeneity – Dr. Nan Cheng, Xidian University, China (Seminar conducted by SIG on AI empowered Internet of Vehicles)
  - [08/23] Unleashing the Power of Mobile Edge-Cloud Generative AI Services and AIGC Networks – Dr. Dusit Niyato, Nanyang Technological University, Singapore
  - [07/23] On Optimal Partitioning and Scheduling of DNNs in Mobile Edge/Cloud Computing – Dr. Jie Wu, Temple University, USA
  - [01/23] On Communication and Sensing Measurements and Modeling for Next "G" – Dr. Nada T. Golmie, National Institute of Standards and Technology, USA
  - [01/22] 5G and Future G Wireless Security – Dr. Arup Bhuyan, Idaho National Laboratory, USA (Seminar conducted by SIG on AI and Machine Learning in Security)

Slides and recordings posted at: *https://cn.committees.comsoc.org/seminars/*

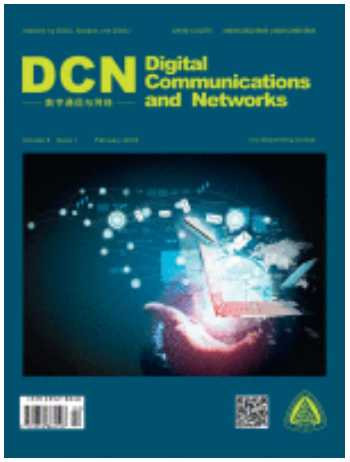
Journal Collaboration

Impact Factor 8.6



Impact Factor 4.1

Impact Factor 7.9



China Institute of Communications recommended top journals

1	China Communications	1673-5447
2	Digital Communications and Networks	2352-8648
3	Frontiers of Information Technology & Electronic Engineering	2095-9184
4	Journal of Communications and Information Networks	2096-1081

Recommend AEs, submitting papers, serving as reviewers, and organizing special issues.

16	IEEE TRANSACTIONS ON COGNITIVE COMMUNICATIONS AND NETWORKING	2332-7731
17	IEEE TRANSACTIONS ON COMMUNICATIONS	0090-6778
18	IEEE TRANSACTIONS ON MOBILE COMPUTING	1536-1233

https://cn.committees.comsoc.org/journals/