Yuhao Chen

Department of Electronic Engineering
Tsinghua University, China
(+86) 15801268079 | chen-yh21@mails.tsinghua.edu.cn | Homepage

Education

Master in Electronic Engineering, **Tsinghua University**, Beijing, China 08/2021-06/2024

- GPA: 3.87 / 4.0, supervisor: Prof. Linglong Dai
- National Scholarship (top 4 of 240 candidates)

Bachelor in Electronic Engineering, Tsinghua University, Beijing, China 08/2017-06/2021

- GPA: 3.74 / 4.0

Research Interests

- Reconfigurable Intelligent Surface (RIS) assisted wireless communications
- Channel state information (CSI) acquisition for extremely large-scale antenna array (ELAA)
- Signal processing for massive multiple-input-multiple-output (MIMO)

Publications

Published 4 journal papers/book chapters and 3 conference papers in the field of sixth-generation (6G) wireless communications, and 2 journal papers are under review.

Published/accepted book chapters/journal papers

[1] **Y. Chen**, J. Tan, M. Hao, R. MacKenzie, and L. Dai "Accurate beam training for RIS-assisted wideband terahertz communication," *IEEE Transactions on Communications*, 2023. (**IF: 8.2**)

[2] **Y. Chen** and L. Dai, "Non-stationary channel estimation for extremely large-scale MIMO," *IEEE Transactions on Wireless Communications*, 2023. (**IF: 10.4**)

[3] Z. Zhang, **Y. Chen**, Q. Yu, and L. Dai, "IRS architecture and hardware design," *Intelligent Surfaces Empowered 6G Wireless Network*, Wiley-IEEE Press, 2023. (**Book chapter**)

[4] M. Cui, H. Jiang, **Y. Chen**, and L. Dai, "Continuous-time channel prediction based on tensor neural ordinary differential equation," *China Communications*, 2022. (**IF: 4.1**)

Published conference papers

[1] **Y. Chen**, J. Tan, and L. Dai, "Analytical beam training for RIS-assisted wideband terahertz communication," in *Proc. IEEE Global Communications Conference (IEEE GLOBECOM'23)*, Dec. 2023. (lead conference, *IEEE ComSoc*)

[2] **Y. Chen**, Z. Zhang, M. Cui, and L. Dai, "Channel estimation for non-stationary extremely large-scale MIMO," in *Proc. IEEE 95th Vehicle Technology Conference (IEEE VTC'23 Spring)*, Jun. 2023. (flagship conference, *IEEE VTS*)

[3] M. Cui, Z. Wu, **Y. Chen**, S. Xu, F. Yang, and L. Dai, "Demo: Low-power communications based on RIS and AI for 6G," in *Proc. IEEE International Conference on Communications (IEEE ICC'22) Workshop*s, May 2022. (**IEEE ICC 2022 Outstanding Demo Award**, flagship conference, *IEEE ComSoc*)

Journal papers under review

[1] **Y. Chen** and L. Dai, "Near-field wideband beam training for ELAA with uniform circular array," submitted to *Science China Information Science*. (**IF: 8.8**, Major Revision)

[2] **Y. Chen** and L. Dai, "Non-stationary channel estimation for extremely large-scale RIS-assisted wireless communications," submitted to *IEEE Transactions on Communications.* (**IF: 8.2**, Under Review)

Research Experience

Tsinghua University (Department of Electronic Engineering) Beijing, China

Research Assistant to Professor Linglong Dai, *IEEE Fellow* 01/2022-Present

RIS-assisted wireless communications (National Key R & D Program of China)

- Analyzed the power distribution pattern of the beam split effect in RIS-assisted wideband communication systems and proposed a novel analytical beam training framework, which exploited the power distribution pattern and improved the

beam training accuracy significantly. (accepted by *IEEE Transactions on Communications*)

- Proposed a group time block code (GTBC) based RIS decoupling scheme to effectively tackle the spatial non-stationary effect in extremely large-scale RIS-assisted communication systems. Designed a dynamic codebook for RIS-assisted communication systems, which greatly reduced the storage burden and the computational complexity, and proposed the corresponding channel estimation algorithm. (submitted to *IEEE Transactions on Communications*)
- Collaborated with students from the Microwave Research Institute at Tsinghua University to develop an AI-based end-to-end communication prototype together with a 2304-element RIS @ 28 GHz. Published demo at *IEEE International Conference on Communications Workshops*; received the IEEE ICC 2022 Outstanding Demo Award.
- Collaborated with students from the Microwave Research Institute at Tsinghua University to develop a prototype based on a 64-element active RIS @ 3.5 GHz. Published demo at *IEEE Global Communications Conference*. Received the National First Prize of the 17th China Graduate Electronic Design Competition, 2022.
- Conducted several field tests on the RIS performance, and the results have been included in several white papers and reported at Global 6G Development Conference, 2022.

Tsinghua University (Department of Electronic Engineering) Beijing, China

Research Assistant to Professor Linglong Dai, *IEEE Fellow* 08/2022-Present

CSI acquisition for ELAA (Key Project of National Natural Science Foundation of China)

- Proposed a GTBC-based signal extraction scheme to enable channel estimation in non-stationary ELAA systems with hybrid precoding architectures, and demonstrated how this algorithm can significantly improve the estimation accuracy by one order of magnitude (15dB) compared to classical algorithms. (accepted by *IEEE Transactions on Wireless Communications*)
- Analyzed the frequency-dependent focusing property in the wideband uniform circular array systems and proposed an effective beam training framework. (submitted to *Science China Information Science*, Major Revision)
- Conducted the test of the proposed beam training framework in the prototype based on NI mmWave Transceiver System and verified the efficiency of the proposed framework.

Patents

PCT Patent

[1] L. Dai, **Y. Chen**, J. Li, J. Tan, M. Hao, and R. MacKenzie, “Low cost beam training method and codebook design for RIS-assisted wideband wireless communication system”, 2022-08-07, PCTCN2022/104529.

Chinese Patent

[2] L. Dai, **Y. Chen**, “Channel estimation for extremely large-scale MIMO”, 2023-08-09, ZL202310680438.8.

Honor and Awards

- **National Scholarship** at Tsinghua University (**Top 4 among 240** candidates at Dept. EE), 2023
- **National First Prize** of the China Graduate Electronic Design Competition, 2022
- **IEEE ICC Outstanding Demo Award (**Demo award of the **flagship conference** of *IEEE ComSoc***)**, 2022
- **Gold medal** of International Exhibition of Inventions of Geneva, 2022
- **Gold medal** of Invention and Innovation Competition of Beijing, 2022
- **Gold medal** of National Exhibition of Inventions of China, 2021
- **Grand Prize** of the 11th "Challenge Cup" Technological Innovation Competition of Capital, 2021
- **Comprehensive Excellence Scholarship** of Tsinghua University, 2020
- **“Stars of Electronic” Award** at Tsinghua University (**Top 5 among 1089** candidates at Dept. EE), 2020
- **Comprehensive Excellence Scholarship** of Tsinghua University, 2018

Skills

- Languages: Native Mandarin Speaker, Advanced English (TOFEL-iBT score of 104)
- Software + Technical: Proficiency in simulations using C/C++, MATLAB, Python, and Pytorch for deep learning
- Proficiency in prototype development and field test