ZHIHUI GAO

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RESEARCH INTERESTS

Next-Generation Network Systems, Machine Learning Acceleration, Cyber-Physical Systems, Simulation-to-Reality, Integrated Sensing and Communication, and Spectrum Sensing.

EDUCATION

- **Duke University** *Durham, NC*
  Ph.D. in Electrical and Computer Engineering *August 2020 - Present*
  M.S. in Electrical and Computer Engineering *August 2020 - September 2023*
  Advisor: Prof. Tingjun Chen and Prof. Yiran Chen

- **Fudan University** *Shanghai, China*
  B.Eng. in Electrical Engineering *September 2016 - June 2020*
  Advisor: Prof. Yuedong Xu
  GPA: 3.83/4.0 (Ranked 2^{nd}/189); selected to Elite Engineering Program (top 5%)

- **University of Texas at Austin** *Austin, TX*
  Exchange Program in Electrical and Computer Engineering *August 2018 - December 2018*
  GPA: 4.0/4.0

SELECTED PUBLICATIONS

[1] **Zhihui Gao**, Zhecun Liu, Tingjun Chen. Chameleon: Integrated Sensing and Communication with Sub-Symbol Beam Switching in mmWave Networks. In *Proc. IEEE MTT-S RF Systems & Applications Symposium (**RFSA'26**)*, 2026, 4 pages.

[2] **Zhihui Gao**, Sri Krishna Vadlamani, Kfir Sulimany, Dirk Englund, Tingjun Chen. Disaggregated Machine Learning via in-physics Computing at Radio Frequency. In ***Science Advances***, 2026, 11+89 pages.

[3] Zhenzhou Qi, Chung-Hsuan Tung, **Zhihui Gao**, Tingjun Chen. Nexus: Efficient and Scalable Multi-Cell mmWave Baseband Processing with Heterogeneous Compute. In *Proc. ACM International Conference on Mobile Computing and Networking (**MobiCom'26**)*, 2026, 15 pages.

[4] **Zhihui Gao**, Sri Krishna Vadlamani, Kfir Sulimany, Dirk Englund, Tingjun Chen. WISE: Wireless Analog Computing at Radio Frequency for Disaggregated Deep Learning Inference. In *Neurips'25 Workshop on AI and ML for Next-Generation Wireless Communications and Networking (**AI4NextG'25**)*, 2025, 8 pages.

[5] **Zhihui Gao**, Zhecun Liu, Tingjun Chen. Chameleon: Integrated Sensing and Communication with Sub-Symbol Beam Switching in mmWave Networks. In *arXiv preprint arXiv:2509.14628*, 2025, 14 pages.

[6] **Zhihui Gao**, Zhecun Liu, Tingjun Chen. BatStation: Toward in-situ Radar Sensing on 5G Base Stations with Zero-Shot Template Generation. In *arXiv preprint arXiv:2509.06898*, 2025, 14 pages.

[7] Ningyuan Yang, Lyu Guanliang, Mingchen Ma, Yiyi Lu, Yiming Li, **Zhihui Gao**, Hancheng Ye, Jianyi Zhang, Tingjun Chen, Yiran Chen. IoT-MCP: Bridging LLMs and IoT Systems through Model Context Protocol. In *Proc. ACM MobiCom'24 Workshop on Wireless Network Testbeds, Experimental Evaluation & CHaracterization (**WiNTECH'25**)*, 2025, 8 pages.

[8] Yiming Li, Scarlett Francini, **Zhihui Gao**, Tingjun Chen. ClickDT: Building Scalable and High-Resolution Wireless Digital Twins with a Few Clicks. (*Demo*) In *Proc. IEEE Military Communication Conference (**MILCOM'25**)*, 2025, 2 pages.

[9] Wei Cheng, **Zhihui Gao**, Jose Guajardo, Hesham Beshary, Ali Niknejad, Tingjun Chen. SPEAR+: Streaming-based Multi-Channel SDR Implementation Using the RFSoC Platform. In *Proc. IEEE Military Communication Conference (**MILCOM'25**)*, 2025, 6 pages.

[10] Xueying Wu, Baijun Zhou, **Zhihui Gao**, Yuzhe Fu, Qilin Zheng, Yintao He, Hai Li. KLLM: Fast LLM Inference with K-Means Quantization. In *arXiv preprint arXiv:2507.23035*, 2025, 13 pages.

[11] Sri Krishna Vadlamani, Kfir Sulimany, **Zhihui Gao**, Tingjun Chen, Dirk Englund. Machine Intelligence on Wireless Edge Networks. In *arXiv preprint arXiv:2506.12210*, 2025, 14 pages.

[12] Yiming Li, **Zhihui Gao**, Joshua Palathinkal, Monisha Ghosh, Tingjun Chen. A Generalized Deep Learning Model for Signal Coverage Prediction in the CBRS Band. In *Proc. IEEE International Symposium on Dynamic Spectrum Access Networks (**DySPAN'25**)*, 2025, 5 pages.

[13] Wei Cheng, **Zhihui Gao**, and Tingjun Chen. SPEAR: Software-defined Python-Enhanced RFSoC for wideband radio applications. In *Proc. ACM MobiCom'24 Workshop on Wireless Network Testbeds, Experimental Evaluation & CHaracterization (**WiNTECH'24**)*, 2024, 8 pages.

[14] Wei Cheng, **Zhihui Gao**, and Tingjun Chen. Real-time Wideband Software-defined Radio with Python Programmability based on RFSoC. (*Demo*) In *Proc. ACM International Conference on Mobile Computing and Networking (**MobiCom'24**)*, 2024, 3 pages.

[15] **Zhihui Gao***, Yunjia Zhang*, and Tingjun Chen. DeepMon: Wi-Fi monitoring using sub-Nyquist sampling rate receivers with deep learning. In *Proc. ACM MobiCom24 Workshop on Machine Learning for NextG Networks (**MLNextG'24**)*, 2024, 6 pages.

[16] **Zhihui Gao**, Zhenzhou Qi, Tingjun Chen. Mambas: Maneuvering Analog Multi-User Beamforming using an Array of Subarrays in mmWave Networks. In *Proc. ACM International Conference on Mobile Computing and Networking (**MobiCom'24**)*, 2024, 15 pages.

[17] Yiming Li, Zeyu Li, **Zhihui Gao**, Tingjun Chen. Geo2SigMap: High-Fidelity RF Signal Mapping Using Geographic Databases. In *Proc. IEEE International Symposium on Dynamic Spectrum Access Networks (**DySPAN'24**)*, 2024, 9 pages.

[18] **Zhihui Gao**, Yiran Chen, Tingjun Chen. Swirls: Sniffing Wi-Fi using radios with low sampling rates. In *Proc. ACM International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (**MobiHoc'23**)*, 2023, 10 pages.

[19] Zhenzhou Qi, **Zhihui Gao**, Chung-Hsuan Tung, and Tingjun Chen. Programmable millimeter-wave MIMO radios with real-time baseband processing. In *Proc. ACM MobiCom23 Workshop on Wireless Network Testbeds, Experimental Evaluation & CHaracterization (**WiNTECH'23**)*, 2023, 8 pages.

[20] Tingjun Chen, Prasanthi Maddala, Panagiotis Skrimponis, Jakub Kolodziejski, Abhishek Adhikari, Hang Hu, **Zhihui Gao**, Arun Paidimarri, Alberto Valdes-Garcia, Myung Lee, Sundeep Rangan, Gil Zussman, Ivan Seskar. (*Invited*) Open-access millimeter-wave software-defined radios in the PAWR COSMOS testbed: Design, deployment, and experimentation. In *Elsevier Computer Networks (**COMNET**)*, 2023, 12 pages.

[21] Jianyi Zhang, Zhixu Du, Jingwei Sun, Ang Li, Minxue Tang, Yuhao Wu, **Zhihui Gao**, Martin Kuo, Hai-Helen Li, Yiran Chen. Next Generation Federated Learning for Edge Devices: An Overview. (*Invited*) In *Proc. IEEE International Conference on Collaboration and Internet Computing (**CIC'22**)*, 2022, 6 pages.

[22] **Zhihui Gao**, Ang Li, Dong Li, Jialin Liu, Jie Xiong, Yu Wang, Bing Li, Yiran Chen. MOM: Microphone based 3D Orientation Measurement. In *Proc. ACM/IEEE International Conference on Information Processing in Sensor Networks (**IPSN'22**)*, 2022, 13 pages.

[23] **Zhihui Gao**, Minxue Tang, Ang Li, Yiran Chen. An Audio Frequency Unfolding Framework for Ultra-Low Sampling Rate Sensors. (*Invited*) In *Proc. IEEE International Symposium on Quality Electronic Design (**ISQED'22**)*, 2022, 6 pages.

[24] **Zhihui Gao**, Ang Li, Yunfan Gao, Bing Li, Yu Wang, Yiran Chen. FedSwap: A Federated Learning based 5G Decentralized Dynamic Spectrum Access System. (*Invited*) In *Proc. IEEE/ACM International Conference On Computer Aided Design (**ICCAD'21**)*, 2021, 6 pages.

[25] **Zhihui Gao**, Ang Li, Yunfan Gao, Yu Wang, Yiran Chen. Hermes: Decentralized Dynamic Spectrum Access System for Massive Devices Deployment in 5G. In *Proc. International Conference on Embedded Wireless Systems and Networks (**EWSN'21**)*, 2021, 12 pages.

[26] **Zhihui Gao***, Yunfan Gao*, Sulei Wang, Dan Li, Yuedong Xu. CRISLoc: Reconstructable CSI Fingerprinting for Indoor Smartphone Localization. *IEEE Internet of Things Journal (**IoT Journal**)*, 2020, 16 pages.

TEACHING EXPERIENCE

Course Client

- DATA481/766: Leading Research Teams — *Fall 2025*
  University of North Carolina at Chapel Hill — *Chapel Hill, NC*
  Instructor: Prof. James Marron, Prof. Jingping Nie, and etc.

Teaching Assistant

- High school outreach with Inspiring Minds — *Spring 2025*
  Cary Academy — *Cary, NC*
- ECE590: Full-stack IoT Systems — *Spring 2024*
  Duke University — *Durham, NC*
  Instructor: Prof. Tingjun Chen
- ECE495/CS390: Full-stack IoT Systems — *Fall 2023*
  Duke University — *Durham, NC*
  Instructor: Prof. Tingjun Chen
- High school outreach with Inspiring Minds — *Fall 2023*
  Hillside High School — *Durham, NC*
- High school outreach with Inspiring Minds — *Spring 2023*
  Hillside High School — *Durham, NC*

PROFESSIONAL SERVICE

Technical Program Committee

- ACM MobiCom'25 Workshop on Intelligent Acoustic Systems and Applications — *2025*

Reviewer

- ACM Transactions on Computing for Healthcare — *2025/2026*
- IEEE Transactions on Mobile Computing — *2025*
- IEEE INFOCOM DTWIN'25 — *2025*
- IEEE Transactions on Network Science and Engineering — *2024/2025*
- IEEE Communications Standards Magazine — *2024*
- IEEE MASS'24 — *2024*
- IEEE Transactions on Wireless Communications — *2024*
- ACM/IEEE SEC'22 — *2022*
- IEEE Internet of Things Journal — *2022/2024/2025*

INVITED TALKS

- MIT's OQE Seminar *February 2026*
  A wireless in-physics computing architecture using a frequency mixer for DL at the edge
- NSF Athena Seminar *October 2025*
  A wireless in-physics computing architecture using a frequency mixer for DL at the edge

MENTORING

Master Students

- Yiming Li at Duke University *Summer 2023 - Spring 2024*
- Xiangru Chen at Duke University *Fall 2021*

Undergraduate Students

- Devon Knox at Duke University *Fall 2025*
- Scarlett Francini at Duke University *Fall 2024 - Fall 2025*
- Junyao (Bill) Zheng at Duke University *Fall 2024 - Spring 2025*
- Yunjia Zhang at Carnegie Mellon University *Summer 2024*
- Zeyu Li at Duke University *Summer 2023 - Spring 2024*
- Olivia Fan at Duke University *Spring 2023*

High School Students

- Alister Devins at Cary Academy *Summer 2025*
- Nayan Patel at Cary Academy *Summer 2023*
- Runxi Wan at Tenafly High School *Summer 2022 - Summer 2023*
- Denglei Wang at Ranney School *Summer 2022*