

# ZHIHUI GAO

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## RESEARCH INTERESTS

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

## EDUCATION

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

## PUBLICATION

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- [1] **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.
- [2] 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.
- [3] **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.
- [4] **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.
- [5] **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.
- [6] 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.
- [7] Yiming Li, Scarlett Francini, **Zhihui Gao**, Tingjun Chen. Demo: ClickDT: Building Scalable and High-Resolution Wireless Digital Twins with a Few Clicks. In *Proc. IEEE Military Communication Conference (MILCOM'25 Demo)*, 2025.
- [8] 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.

- [9] 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.
- [10] Sri Krishna Vadlamani, Kfir Sulimany, **Zhihui Gao**, Tingjun Chen, Dirk Englund. Machine Intelligence on Wireless Edge Networks. In *arXiv preprint arXiv:2506.12210*, 2025.
- [11] 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.
- [12] 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.
- [13] Wei Cheng, **Zhihui Gao**, and Tingjun Chen. Demo: Real-time Wideband Software-defined Radio with Python Programmability based on RFSoc. In *Proc. ACM International Conference on Mobile Computing and Networking (MobiCom'24 Demo)*, 2024.
- [14] **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.
- [15] **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.
- [16] 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.
- [17] **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.
- [18] 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.
- [19] 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.
- [20] 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.
- [21] **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.
- [22] **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.

- [23] **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.
- [24] **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.
- [25] **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.

## TEACHING EXPERIENCE

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### 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

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### Technical Program Committee

- ACM MobiCom'25 Workshop on Intelligent Acoustic Systems and Applications (**IASA'25**), 2025.

### Reviewer

- ACM Transactions on Computing for Healthcare, 2025.
- 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.

## MENTORING

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### Master Students

- Yiming Li at Duke University
- Xiangru Chen at Duke University

*Summer 2023 - Spring 2024*  
*Fall 2021*

### **Undergraduate Students**

- Devon Knox at Duke University
- Zhixuan Chen at Tsinghua University
- Ningyuan Yang at Duke Kunshan University
- Scarlett Francini at Duke University
- Junyao (Bill) Zheng at Duke University
- Baijun Zhou at Fudan University
- Yunjia Zhang at Carnegie Mellon University
- Zeyu Li at Duke University
- Yixin Liang at Zhejiang University
- Olivia Fan at Duke University

*Fall 2025 - Present*  
*Summer 2025 - Present*  
*Summer 2025 - Present*  
*Fall 2024 - Present*  
*Fall 2024 - Spring 2025*  
*Summer 2024*  
*Summer 2024*  
*Summer 2023 - Spring 2024*  
*Summer 2023*  
*Spring 2023*

### **High School Students**

- Alister Devins at Cary Academy
- Nayan Patel at Cary Academy
- Runxi Wan at Tenaflly High School
- Denglei Wang at Ranney School

*Summer 2025*  
*Summer 2023*  
*Summer 2022 - Summer 2023*  
*Summer 2022*