Ruiyang Zhu

Webpage: https://ry4nzhu.github.io/

Email : ryanzhu@umich.edu
Mobile : +1-734-846-9123

Education

- **University of Michigan, Ann Arbor** — Michigan, United States
  Ph.D. in Computer Science and Engineering, Research Assistant; GPA: 3.94/4.00 — *Sept 2020 - Mar 2026 (expected)*
  `Research Interests: AI + Systems, Connected Vehicle Systems, and Networked Systems.`
- **University of Michigan, Ann Arbor** — Michigan, United States
  B.S.E. in Computer Engineering, GPA: 4.00/4.00 — *Sept 2018 - Apr 2020*
- **Shanghai Jiao Tong University** — Shanghai, China
  B.S.E. in Electrical and Computer Engineering, GPA: 3.73/4.00 — *Sept 2016 - Aug 2020*

Publications and Patents

- **[IROS'25 (Oral)]** SCORPION: Robust Spatial-Temporal Collaborative Perception Model on Lossy Wireless Network
  ***Ruiyang Zhu**, M. Cho, S. Zeng, F. Bai, Z. Mao*
  IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2025
- [CVPRW'25] Scalable Crowd-sourced Global HD Map Construction via Collaborative Map Perception and Sparse Graph Fusion
  ***Ruiyang Zhu**, M. Cho, S. Zeng, F. Bai, X. Gao, Z. Mao*
  Proceedings of the 4th Workshop on Transformers for Vision at CVPR, 2025
- **[SenSys'24]** Boosting Collaborative Vehicular Perception on the Edge with Vehicle-to-Vehicle Communication
  ***Ruiyang Zhu**, X. Zhu, A. Zhang, X. Zhang, J. Sun, F. Qian, Z. Mao, H. Qiu, M. Lee*
  Proceedings of the 22nd ACM Conference on Embedded Networked Sensor Systems, 2024
- [MMSys'24] OASIS: Collaborative Neural-Enhanced Mobile Video Streaming — **Best Paper Award**
  *S. Jin, **Ruiyang Zhu**, A. Hassan, X. Zhu, X. Zhang, Z. Mao, F. Qian, Z. Zhang*
  Proceedings of the 15th ACM Multimedia Systems Conference, 2024
- **[MobiCom'23]** Robust Real-time Multi-vehicle Collaboration on Asynchronous Sensors
  ***Ruiyang Zhu* (Equal contribution)**, Q. Zhang*, X. Zhang*, F. Bai, M. Naserian, Z. Mao*
  Proceedings of the 29th Annual International Conference on Mobile Computing and Networking, 2023
- **[SIGCOMM'22]** Vivisecting Mobility Management in 5G Cellular Networks
  *A. Hassan, A. Narayanan, A. Zhang, W. Ye, **Ruiyang Zhu**, S. Jin, J. Carpenter, Z. Mao, F. Qian, Z. Zhang*
  Proceedings of the ACM Special Interest Group on Data Communication Conference, 2022
- **[SIGCOMM'21]** A Variegated Look at 5G in the Wild: Performance, Power, and QoE Implications
  *A. Narayanan, X. Zhang, **Ruiyang Zhu**, A. Hassan, S. Jin, X. Zhu, D. Rybkin, M. Yang, D. Zhang, Z. Mao, et al.*
  Proceedings of the ACM Special Interest Group on Data Communication Conference, 2021
- [USENIX Security'24] On Data Fabrication in Collaborative Vehicular Perception: Attacks and Countermeasures
  *Q. Zhang, S. Jin, **Ruiyang Zhu**, J. Sun, X. Zhang, A. Chen, Z. Mao*
  Proceedings of the 33rd USENIX Security Symposium, 2024
- [HotMobile'24] The Case for Boosting Mobile Application QoE via Smart Band Switching in 5G/xG Networks
  *A. Hassan, A. Zhang, W. Ye, J. Carpenter, **Ruiyang Zhu**, S. Jin, Z. Mao, F. Qian, Z. Zhang*
  Proceedings of the 25th International Workshop on Mobile Computing Systems and Applications, 2024
- [US. Patent] Cooperative V2X Sensor Sharing — *US17844978, 2023/12/21*
  *M. Naserian, F. Bai, X. Zhang, **Ruiyang Zhu**, Q. Zhang, X. Zhu, Z. Mao*

Work Experience

- **Packet-level AI-network Simulation Workload Support with LLM Self-Service** — Meta, CA
  Ph.D. Software Engineering Intern - Network Insights Team — *May 2025 - Aug 2025*
  - Developed and deployed support for distributed training topology simulations with Meta's internal LLM agents, enabling faster profiling of various distributed training setups.
  - Designed a generalized conversion template to simulate newly proposed network topologies seamlessly in the framework.

- **Unified Spatial-Temporal Multi-Vehicle Collaborative Perception** — General Motors, MI
  Research Intern - Connected Autonomous Vehicle Group — *June 2024 - Sept 2024*
  - Benchmarked performance of existing collaborative perception methods under sensor localization and synchronization errors.
  - Designed a transformer-based model to fuse multi-vehicle features with tolerance to data misalignment caused by GPS measurement errors, network transmission latency and network packet loss.
- **Robust Multi-vehicle LiDAR Perception on Asynchronous Sensors** — General Motors, MI
  Research Intern - Connected Autonomous Vehicle Group — *May 2023 - Aug 2023*
  - Implemented a range-image-based point cloud clustering algorithm with **4k+** LoC, optimizing runtime by **3.5x**.
  - Built real-time multi-vehicle perception system on NVIDIA Jetson Orin and Cadillac ATS vehicles, boosting detection accuracy by **40%** while sustaining low-latency inference under 100 ms.

Research Experience

- **Hybrid Architecture for Edge-supported Vehicular Collaborative Sensing** — University of Michigan, MI
  Research Assistant - RobustNet Group — *May 2021 - Dec 2023*
  - Designed a multi-vehicle sensor data sharing system with a hybrid architecture that leverages both vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications to allow collaboration among vehicles.
  - Instrumented the Linux kernel to implement the MAC layer prioritization to achieve lower latency for delay-sensitive sensing results and reduced the end-to-end system latency by **18.7%**.
  - Demonstrated the real-time processing capability and achieved **37.1%** end-to-end sensing latency improvement of the system by conducting both trace-driven emulation and real-world driving tests.
- **Cutting-edge Video Streaming System Design** — University of Michigan, MI
  Research Assistant - RobustNet Group — *Dec 2020 - May 2022*
  - Built an adaptive bitrate (ABR) video streaming performance emulation platform based on the DASH.js framework and studied the implication of 5G network to the Quality of Experience of video streaming using various ABR algorithms.
  - Designed and implemented a video streaming system leveraging the 5G Handover prediction model to reduce the video stalls by **37.14-43.22%** and increase the video quality by 1.72% during mobility.
  - Leveraged super-resolution (SR) technique to build a multi-user collaborative video streaming system.
- **Data-driven Precision Localization on Commodity Android Smartphones** — T-Mobile, MI
  Research Assistant - RobustNet Group (in collaboration with T-Mobile) — *July 2021 - May 2022*
  - Implemented a multi-sensor profiling tool on Android 10 to collect on-board sensor data from smartphones with 3k+ LoC.
  - Designed a sensor fusion Machine Learning model for commodity smartphones to infer the indoor/outdoor localization status without GPS with over **89%** accuracy and only **0.1%** of battery overhead.
  - Integrated the ML models and prediction algorithms into an library on Android API 29 and performed unit testing.
- **Comprehensive 5G Measurement Study** — University of Michigan, MI
  Research Assistant - RobustNet Group — *Sept 2020 - Feb 2022*
  - Performed Radio Resource Control (RRC) parameter inference of 5G network to understand the power consumption.
  - Analyzed and quantified the 5G handover performance of major carriers in the U.S. using a cross-country data collection dataset of over **600** GB data and **47,000+** handovers.

Awards And Service

- **Shadow Program Committee of EuroSys 2026**: June 2025
- **Reviewer of ACM Multimedia Conference (ACM MM)**: Apr 2024
- **ACM Multimedia Systems Conference (MMSys) Best Paper Award**: Apr 2024
- **University of Michigan Dean's Honor List**: Winter 2020, Fall 2019, Winter 2019, Fall 2018
- **Shanghai Jiao Tong University Undergraduate Excellent Scholarship**: Nov 2017

Teaching Experience And Invited Talks

- **University of Michigan, EECS**: Graduate Student Instructor for EECS 589 Advanced Computer Networks, Fall 2022
- **Athena AI Institute Seminar Talk**: Enhancing 3D Collaborative Vehicular Perception: Hybrid Communication and Asynchronous Sensor Fusion, Winter 2025
- **Center for Connected and Automated Transportation (CCAT) Safety Working Group Meeting**: Addressing Safety and Security Challenges in ML-based AV Software Stack – Remote Operation Support and Balancing Trade-offs, Winter 2025

Skills Summary

- **Programming Languages**: Python, C++, C, Java, Golang, SQL, Unix scripting
- **Tools**: PyTorch, Docker, GIT, Android Studio, Matlab, LaTeX, LLVM