

Ruiyang Zhu

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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 - present
Research Interests: Networked Systems, Mobile networks, and Connected Vehicle Systems.
- **University of Michigan, Ann Arbor** Michigan, United States
B.S.E. in Computer Engineering, GPA: 4.00/4.00
Sept. 2018 - May. 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

- **[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 (co-primary), Q. Zhang* (co-primary), X. Zhang* (co-primary), 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

- **Unified Spatial-Temporal Multi-Vehicle Collaborative Perception** General Motors, MI
Research Intern - Connected Autonomous Vehicle Group
June 2024 - Current
 - 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 and network transmission latency.
- **Robust Multi-vehicle LiDAR Perception on Asynchronous Sensors** General Motors, MI
Research Intern - Connected Autonomous Vehicle Group
May 2023 - August 2023
 - Implemented a range-image-based LiDAR point cloud clustering algorithm on Velodyne VLS-128 sensors with **4k+** LoC.
 - Constructed a real-time multi-vehicle perception system with Nvidia Jetson Orin on Cadillac ATS vehicles and improved object detection accuracy by up to **40%**.

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 multi-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 application 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 a network-based Radio Resource Control (RRC) parameter inference of the current 5G network to understand the power consumption of 5G cellular network.
 - 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

- **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

SKILLS SUMMARY

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