

Zhenzhou (Tom) Qi

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Research Interests

Virtualized radio access networks (**vRANs**); edge cloud computing; Wireless networks and Digital signal processing;

Education

3.85/4.00	Ph.D. in Electrical and Computer Engineering , <i>Duke University</i> NC, USA	2021-current
3.97/4.00	M.Eng. in Electrical and Computer Engineering , <i>Cornell University</i> NY, USA	2020-21
3.88/4.00	B.S. in Electrical and Computer Engineering (Summa Cum Laude) , <i>Rutgers University</i> NJ, USA	2016-20

Honors & Awards

Duke Graduate School Conference Travel Award , <i>Duke University</i>	Oct 2024
Duke ECE Conference Travel Fellowship , <i>Duke University</i>	Oct 2024
IEEE/Optica OFC'23 Top-Scored Paper , <i>OFC'23</i>	Mar 2023
MWW-2023 Travel Grant , <i>National Science Foundation</i>	Jan 2023
ACM SIGMOBILE Student Community Grant , <i>ACM SIGMOBILE</i>	Sep 2021
Class of 2020 graduation with highest honor (Summa Cum Laude) , <i>Rutgers University</i>	May 2020
Dean's list , <i>Rutgers University</i>	2016-20
Math Honor Session , <i>Rutgers University</i>	2017
• 01:640:152 - Calculus II for the Mathematical and Physical Sciences	
• 01:640:251 - Multivariable Calculus	

Academic Experience

Intern- Wireless R&D RF SYS , <i>Qualcomm Inc</i> CA, USA	Jun 2024 - Aug 2024
• Performed detailed profiling for software and hardware mmWave Radar processing pipeline. Optimized the software DSP stage by 500 times and the FW processing by 2 times.	
• Built real-time visualization for Range Doppler Information for mmWave Radars	
• Built dataset collection pipeline and constructed gesture dataset for mmWave Radars	
• Built static and real-time Deep-Learning based gesture recognition model for mmWave radars	
• Integrate the real-time Deep-Learning based gesture recognition model to volume control App for users to interact with the phone.	
Research Assistant , <i>Duke University</i> NC, USA	Sep 2021 - current
• Implemented programmable mmWave MIMO radios equipped with real-time baseband processing capability using C++ leveraging the open-access PAWR COSMOS testbed.	
• Developed an open-source software infrastructure using C++ to adapt USPR to RENEWLab Sounder framework for channel-sounding measurements and data transmission experiments for massive MIMO networks.	
• Implemented a spectrum sensing pipeline to perform extensive spectrum measurements and data collection for characterizing the spectrum usage and properties of potential interferers; developed an intelligent control plane, which integrates software-defined networking and machine learning techniques, for efficient spectrum monitoring, management, and resource allocation.	
Research Assistant , <i>Weill Cornell Medicine</i> NY, USA	Sep 2020 - May 2021
• Develop our own Multiple Sclerosis Lesion Segmentation (MuLS) challenge that allows teams to submit their outcomes for competition. Used Pyqt5 and VTK to design GUI for our new segmentation method.	
• Reproduced Machine Learning methods: FLEXCONN, OASIS, LST, TOADS to compare to our new segmentation results.	
Research Summer Internship , <i>Wireless Information Network Laboratory (WINLAB)</i> NJ, USA	May 2020 - Aug 2020
• Proposed an experimental design to determine if honeybees can sense RF transmissions in frequencies from 1MHz to 6 GHz.	
• Deployed a custom-designed RF bee feeder near beehives to test honeybees' RF sensing ability.	
• Designed PCB for experiential tasks and EAGLE customized libraries for specific hardware.	
Research Summer Internship , <i>Wireless Information Network Laboratory (WINLAB)</i> NJ, USA	May 2019 - Aug 2019
• Designed a home stereo system using C++ and Python where speakers can automatically adjust phases according to people's position to produce the best sound effect with the same output of physically adjusted angles.	
• Implemented DSP techniques with a one-bit phase alignment algorithm and a system demo was built with embedded devices with live data presentation. This work won the 7th place in the ECE 2020 Capstone Design Project.	
Research Summer Internship , <i>Wireless Information Network Laboratory (WINLAB)</i> NJ, USA	May 2018 - Aug 2018
• Developed a distributed cloud radio access network (C-RAN) using C++ and MATLAB which has tens of distributed radio frontends using USRP N210s software-defined radios (SDRs) in a 20x20x3 m ² area as part of the open-access ORBIT testbed.	
• Proved that by exploiting the inherent hardware properties of low-end IoT devices and the spatial diversity of distributed C-RAN system, the C-RAN can potentially decode collided signals from low-end IoT devices with all signal processing being done on the cloud	

Publications

1. **Z. Qi***, C.-H. Tung*, A.Kalia and T. Chen, “Demo: Savannah: A Real-time Programmable mmWave Baseband Processing Framework,” in *Proc. 30th ACM International Conference on Mobile Computing and Networking (MobiCom’24 Demo)* (to appear), 2024.
2. **Z. Qi***, C.-H. Tung*, A.Kalia and T. Chen, “Savannah: Efficient mmWave Baseband Processing with Minimal and Heterogeneous Resources,” in *Proc. 30th ACM International Conference on Mobile Computing and Networking (MobiCom’24)* (to appear), 2024.
3. Z. Gao, **Z. Qi**, T. Chen, “Mambas: Maneuvering Analog Multi-User Beamforming using an Array of Subarrays in mmWave Networks,” in *Proc. 30th ACM International Conference on Mobile Computing and Networking (MobiCom’24)* (to appear), 2024.
4. D. Hunt, K. Angell, **Z. Qi**, T. Chen, and M. Pajic, “MadRadar: A Black-Box Physical Layer Attack Framework on mmWave Automotive FMCW Radar,” in *Proc. ISOC Network and Distributed System Security Symposium (NDSS’24)*, 2024.
5. Z. Wang, Y.-K. Huang, E. Ip, **Z. Qi**, G. Zussman, D. Kilper, K. Asahi, H. Kageshima, Y. Aono, and T. Chen, “Field Trial of Coexistence and Simultaneous Switching of Real-Time Fiber Sensing and Coherent 400 GbE in a Dense Urban Environment,” in *IEEE/Optica Journal of Lightwave Technology (JLT)*, 42, 4 (2023), 1304–1311.
6. **Z. Qi**, Z. Gao, C.-H. Tung, and T. Chen, “Programmable Millimeter-wave MIMO Radios with Real-Time Baseband Processing,” in *Proc. ACM MobiCom’23 Workshop on Wireless Network Testbeds, Experimental Evaluation & Characterization (WiNTECH’23)*, 2023.
7. YK. Huang, Z. Wang, E. Ip, **Z. Qi**, G. Zussman, D. Kilper, K. Asahi, H. Kageshima, Y. Aono, T. Chen, “Field trial of coexistence and simultaneous switching of real-time fiber sensing and 400GbE supporting DCI and 5G mobile services,” in *Proc. IEEE/Optica Optical Fiber Communication Conference (OFC’23)*, 2023.
8. M. Aldeer, J. Florentine, J. Yu, L. Ryan, **Z. Qi**, J. Kolodziejski, M. Haberland, RE. Howard, RP. Martin, “Demo: Investigating the biological impacts of radio transmissions: poster abstract,” in *Proc. of the 18th ACM Conference on Embedded Networked Sensor Systems (SenSys’20)*, 2020.
9. X. Fan, **Z. Qi**, Z. Jia, Y. Zhang, “Demo: Enabling concurrent iot transmissions in distributed c-ran,” in *Proc. of the 16th ACM Conference on Embedded Networked Sensor Systems (SenSys’18)*, 2018.

Professional Experience

Teaching Assistant - Full-Stack IoT Systems, Duke University | NC, USA

Sep 2024 - Dec 2024

Teaching Assistant - Wireless Networking and Mobile Computing, Duke University | NC, USA

Sep 2022 - Dec 2022

Engineering Ambassador, School of Engineering, Rutgers University | NJ, USA

Sep 2018 - May 2020

- Provided campus tours, sit on student panels, participate in Engagement events
- Served as a representative to share the mission and vision.

Learning Assistant (Physics IIA), Learning Center at Rutgers University | NJ, USA

Sep 2018 - May 2020

- Practiced communications skills and leadership skills
- Addressed students’ problems and grade pre-recitation exercises

Peer Tutor, Learning Center at Rutgers University | NJ, USA

Jan 2018 - Aug 2018

Society of Asian Scientists and Engineers (SASE), Rutgers University | NJ, USA

Sep 2017 - May 2018

- Participated in Professional, cultural events, and community services
- Handled budgets of the organization

Professional Services

2023 High school outreach with Inspiring Minds at Hillside High School in Durham, NC

2022 IEEE International Conference on Parallel and Distributed Systems (ICPADS, TPC member for Wireless Sensing & Mobile Computing Track 2022)

Skills

Programming C/C++, CMake, Python, Matlab, Git, Scripting (Bash), LaTeX, Vim

Software Linux, GNU-Radio, Pytorch, Docker