

Shiva Acharya

Ph.D. Candidate, Electrical and Computer Engineering (Wireless@VT)

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EDUCATION

Ph.D. Candidate, Electrical and Computer Engineering

Virginia Tech, Blacksburg, VA

Spring 2021 - Present

Expected Graduation: Spring 2026

M.S., Computer Engineering

Virginia Tech, Blacksburg, VA

Degree awarded: Spring 2023

B.S., Electrical Engineering (Summa Cum Laude)

McNeese State University, Lake Charles, LA

May 2020

HONORS AND AWARDS

Awarded CCI SWVA Cyber Innovation Scholar Fund

Spring 2024 - Fall 2024

Chosen as CCI SWVA Cyber Innovation Scholar

Spring 2023 - Fall 2024

Most Technically Enlightening Presentation, Inaugural CCI Graduate Student Summit

Spring 2024

Summa Cum Laude, McNeese State University

May 2020

President's Honor List, McNeese State University

Fall 2016 - May 2020

Design Award, South Texas VEXU Robotics Qualifying Tournament

2020

PUBLICATIONS

- **S. Acharya**, S. Li, N. Jiang, W. Xie, W. Lou, and Y. T. Hou, "Small Data Big Result: A New Approach to Tackle Channel Uncertainty with Limited Data Samples," submitted to *IEEE Wireless Communications Magazine*.
- **S. Acharya**, S. Li, Y. Wu, N. Jiang, W. Lou, and Y. T. Hou, "Rudra: Minimizing Spectrum Usage with Data Rate Guarantee in Next-G Communications," accepted at *IEEE MILCOM 2024*.
- **E. Ghoreishi**, B. Abolhassani, Y. Huang, **S. Acharya**, W. Lou, and Y. T. Hou, "Cyrus: A DRL-based Puncturing Solution to URLLC/eMBB Multiplexing in O-RAN," *Proc. IEEE ICCCN*, pp. 1-9, Kailua-Kona, HI, USA, 2024.
- **S. Acharya**, S. Li, N. Jiang, Y. Wu, Y. T. Hou, W. Lou, and W. Xie, "Mitra: An O-RAN based Real-Time Solution for Coexistence between General and Priority Users in CBRS," *Proc. IEEE MASS*, pp. 295-303, Toronto, Canada, 25-27 Sept. 2023.

TECHNICAL STRENGTHS

Programming Languages: C/C++, Python, CUDA, Matlab, Java

Software: Visual Studio, Spyder, Matlab/Simulink (5G Toolbox), Eclipse

Skills: Experienced knowledge in wireless networking, algorithm design, real-time optimization

PROJECT AND RESEARCH EXPERIENCES

[P5] MU-MIMO Scheduler Under CSI Uncertainty Fall 2023 – present

- *Optimization:* Designed an algorithm to minimize spectrum usage in MU-MIMO systems through resource allocation, rate adaptation, and beamforming.
- *CSI Uncertainty:* Modeled CSI uncertainty using limited CSI data without assuming known distributions, transforming the original stochastic optimization problem into a deterministic problem.
- *Data Rate Guarantees:* Developed a solution providing probabilistic data rate guarantees for UEs under CSI uncertainty.

[P4] DRL for URLLC/eMBB Multiplexing Fall 2023 – Spring 2024

- *DRL Implementation:* Applied Deep Reinforcement Learning (DRL) in 5G networks to meet URLLC latency requirements by puncturing eMBB traffic.
- *O-RAN Optimization:* Optimized the DRL algorithm based on different time scale control loops in the O-RAN framework for faster convergence and URLLC compliance.
- *Simulation:* Conducted 5G link-level simulations using MATLAB 5G Toolbox to model URLLC/eMBB puncturing.

[P3] Real-Time Algorithm Design for Spectrum Coexistence Summer 2023 – Fall 2023

- *Algorithm Design:* Developed a parallel resource allocation algorithm to meet 5G's 1 ms scheduling requirement under numerology 0.
- *Parallel Processing:* Decomposed the problem into a massive number of subproblems, selecting the promising subproblems based on domain knowledge and solving them in parallel using CUDA C++ on an NVIDIA Tesla V100 GPU.
- *GPU Optimization:* Streamlined memory management, thread blocks, and communication overhead to meet real-time constraints.

[P2] Spectrum Sharing Under CSI Uncertainty Spring 2022 – Summer 2023

- *Uncertainty Modeling:* Addressed CSI uncertainty in CBRS spectrum sharing without assuming known channel distributions.
- *Interference Protection:* Developed a small-data approach using limited CSI samples to ensure interference protection guarantees.
- *Resource Optimization:* Optimized resource and power allocation in secondary networks to provide interference protection to the primary network while maximizing system throughput.

[P1] Project Leader, LaACES Ballooning Program Sep 2019 – May 2020

- *Team Leadership:* Led the NASA-sponsored LaACES project to design and test a telemetry system tracking a payload at altitudes up to 30 km.
- *Payload Design:* Developed a system to capture and transmit images, GPS data, and atmospheric information in real-time to a ground station.

TEACHING EXPERIENCE

Teaching Assistant, ENGR 430: Systems and Control	May 2020 - Dec. 2020
Teaching Assistant, ELEN 210: Circuits I	Aug. 2019 - May 2020
Lab Assistant, ELEN 341: Linear Electronics	Aug. 2019 - May 2020
Lab Assistant, ELEN 362: Microprocessing System Design	Aug. 2019 - May 2020

PROFESSIONAL SERVICES

Treasurer, IEEE McNeese Student Chapter	Aug. 2019 - May 2020
Treasurer, Nepalese Student Association at McNeese State University	Aug. 2019 - May 2020
Volunteered as a Referee and Judge on VEXU Robotics Competition, LA	March 2019 - Feb. 2020

REFERENCES

Prof. Tom Hou: Bradley Distinguished Professor of ECE, Virginia Tech, thou@vt.edu

Prof. Wenjing Lou: W. C. English Endowed Professor of CS, Virginia Tech, wjlou@vt.edu

Prof. Jeff Reed: Willis G. Worcester Professor of ECE, Virginia Tech, reedjh@vt.edu