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	2024
Chosen as CCI SWVA Cyber Innovation Scholar	2024
Featured on VT News: Rung by rung, graduate students climb toward cybersecurity careers	2024
Awarded Most Technically Enlightening Presentation at *Inaugural CCI Graduate Student Summit*	2023
Spotlight: Featured student at Commonwealth Cyber Initiative (CCI) Southwest Virginia	2023
Awarded CCI SWVA Cyber Innovation Scholar Fund	2023
Chosen as CCI SWVA Cyber Innovation Scholar	2023
Summa Cum Laude, McNeese State University	2020
Won Design Award at VEXU Robotics Competition, Houston, TX, USA	2020
President's Honor List, McNeese State University	2016 - 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: An Algorithm for Optimizing Spectrum Efficiency 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 Fall 2019 – Spring 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.

PRESENTATIONS

• Presented poster at the *CCI Symposium*, Richmond, VA, USA, Apr. 15, 2024
• Presented poster at the *Annual CCI Student Researcher Showcase*, Blacksburg, VA, USA, Mar. 22, 2024
• Presented at the *Southwest Virginia Graduate Student Summit,* Blacksburg, VA, USA, Nov. 03, 2023.

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
Referee and Judge (Volunteer), VEXU Robotics Competition, LA	Mar. 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