Fatemeh Lotfi

Clemson, South Carolina, USA

☐ (+1) (719) 639-1298 | ✉ flotfi@clemson.edu | 🔗 https://www.linkedin.com/in/fatemeh-lotfi-1a860359/

Summary

Dedicated and forward-thinking AI Researcher and Electrical Engineer specializing in the synergy between artificial intelligence and wireless communication systems. At Clemson University, I am deeply immersed in the development of cutting-edge distributed learning algorithms and deep reinforcement learning applications designed to optimize next-generation wireless networks. My academic journey is punctuated with targeted research in decentralized decision-making within multi-agent systems, aimed at enhancing the functionality and efficiency of 5G/6G networks and IoT environments. With a background that includes hands-on algorithm development and a keen understanding of signal processing, my work stands at the forefront of intelligent system design, driving advancements that are both innovative and aligned with industry best practices.

Education

Doctor of Philosophy in Electrical & Computer Engineering
Aug. 2022 - May 2025 (Expected)

Clemson University
Clemson, SC

- Thesis: Decentralized Decision Making in Multi-Agent Wireless Communication Systems.

Master of Science in Electrical & Computer Engineering

University of Tehran
Tehran, Iran

- Thesis: Efficient Selection of the Best Relay in Dual-Hop Opportunistic Relaying.

Bachelor of Science in Electrical & Computer Engineering

Iran University of Science and Technology
Tehran, Iran

- Thesis: Performance Analysis of N-MSK Modulation in OFDM Systems.

Research Interests

- **Distributed and Decentralized Machine Learning**
- **Advanced Wireless Communications (5G/6G)**
- **Deep Reinforcement Learning (DRL)**
- **Intelligent Network Optimization and Signal Processing**

Research Projects

Deep Learning for RAN Management
Aug. 2022 - Present

Clemson University
Clemson, SC

- Developed a deep learning model for adaptive resource allocation in Open RAN environments.
- Built a simulation environment on Python using Pytorch for dynamic network slicing.
- Introduced a novel AI-based approach for proactive network management in 5G RAN.
- Devised deep reinforcement learning strategies to manage network slices in Open RAN, significantly enhancing network responsiveness and user QoS.
- Innovated with evolutionary deep learning to dynamically manage network slices in O-RAN, ensuring real-time resource adaptability.

AI-Enhanced Wireless Network Systems
Aug. 2022 - Aug 2023

Clemson University
Clemson, SC

- Advanced the integration of AI in UAV network operations through Apprenticeship Learning and Deep Inverse Reinforcement Learning for optimized path and power management.
- Engineered LSTM models to predict traffic in Open RAN systems, substantially improving the efficiency of network slicing.

Advanced ML for Emotion Detection
Aug. 2022 - May. 2023

Clemson University
Clemson, SC

- Developed state-of-the-art facial recognition techniques using Triplet Loss-less Center Loss, which set new standards for accurate emotion detection.

Signal Processing and Network Optimization
Jan. 2021 - Aug. 2022

University of Colorado (UCCS)
Colorado Springs, CO

- Applied semantic-aware deep reinforcement learning to refine communication protocols across wireless cellular networks.
- Conducted thorough optimization of uplink network structures, yielding improvements in both spectrum efficiency and network stability.
- Build a simulation environment by MATLAB to implement the proposed approach for optimization problem solving.
- Build a simulation environment using Python and OpenAI Gym to implement the proposed collaboration approach between heterogeneous RL agents.

Work Experience

Graduate Research Assistant
Aug. 2022 - Present

Clemson University
Clemson, SC

- Conduct research on the intersection of the next-generation wireless communication systems and AI.
- Develop algorithms with open-source modules of Python to improve the performance of wireless communication systems.
- To evaluate the algorithm on the testbeds with real emulation.
- Study 3GPP standards to ensure that the work aligns with industry best practices.
- Present and publish the findings.

Research Assistant
Jan. 2021 - Aug. 2022

University of Colorado (UCCS)
Colorado Springs, CO

- Engage in advanced research focusing on the future of wireless communications and artificial intelligence.
- Create algorithms utilizing Python's open-source modules to enhance the performance of wireless communication systems.
- Thoroughly examine 3GPP standards to ensure compliance with industry-leading practices.
- Deliver presentations and publish research findings to disseminate knowledge.

Research and Development Engineer
Sep 2013 - Sep 2020

Sepehr Co.
Tehran, Iran

- Developed IoT-based smart systems for healthcare monitoring.
- Designed algorithms for noise cancellation, equalization, Kalman filtering, OCR, and signal calibration.
- Collaborated on implementing innovative solutions based on research insights.

Skills

- **Deep Learning**: TensorFlow, PyTorch, Keras
- **Data Science and Analysis Tools**: Pandas, Numpy, Scikit-Learn, Jupyter
- **Programming Languages**: Python, MATLAB
- **Scientific Writing and Visualization**: Matplotlib, LaTeX

- **Communication and Signal processing**: Digital Communication, Wireless Standards, Mobile Communications, Signal Processing, Cellular Networks, 5G Technologies
- **Mathematics**: Probability, Stochastic Process, Statistics, Linear Algebra, and Graph Theory
- **Version Control and Development Tools**: GitHub

Publication

P1 H. Rajoli, **F. Lotfi**, H. Kashiani, N. Alipour ,& F. Afghah, (2024, October). SAMPLe: Sharpness Aware Minimization based Prompt Learning for Vision Language Models. *Submitted to CVPR 2025*.

P2 **F. Lotfi**, H. Rajoli, F. Afghah, "LLM-Augmented Deep Reinforcement Learning for Dynamic O-RAN Network Slicing", *Submitted to IEEE International Conference on Communications (ICC) 2025* .

P3 **F. Lotfi**, H. Rajoli, F. Afghah, "Sharpness-Aware O-RAN Resource Management Using Multi-Agent Reinforcement Learning", *Submitted to IEEE International Conference on Computer Communications (INFOCOM) 2025* .

P4 **F. Lotfi**, F. Afghah, "Meta Reinforcement Learning Approach for Adaptive Resource Optimization in O-RAN", *Submitted to IEEE Wireless Communications and Networking Conference (WCNC) 2025* .

P5 A. Shamsoshoara, **F. Lotfi**, S. Mousavi, F. Afghah, and İ. Güvenç, "Joint Path planning and Power Allocation of a Cellular-Connected UAV using Apprenticeship Learning via Deep Inverse Reinforcement Learning", submitted to *Elsevier Computer Networks Journal*, 2024. (under peer-reviewing process)

P6 **F. Lotfi**, F. Afghah, "Open RAN LSTM Traffic Prediction and Slice Management using Deep Reinforcement Learning", *Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, 2023.

P7 **F. Lotfi**, F. Afghah, J. Ashdown, "Attention-based Open RAN Slice Management using Deep Reinforcement Learning", *IEEE Global Communications Conference (GLOBECOM)*, Kuala Lumpur, Malaysia, 2023.

P8 H. Rajoli, **F. Lotfi**, A. Atyabi, and F. Afghah, "Triplet Loss-less Center Loss Sampling Strategies in Facial Expression Recognition Scenarios." *Conference on Information Science and Systems (CISS)* , Baltimore, Maryland, March 2023.

P9 **F. Lotfi**, O. Semiari, and F. Afghah, "Evolutionary Deep Reinforcement Learning for Dynamic Slicing Management in O-RAN", *IEEE Global Communications Workshop Conference (GLOBECOM)*, Rio de Janeiro, Brazil, December 2022.

P10 **F. Lotfi**, O. Semiari, and W. Saad, "Semantic-Aware Collaborative Deep Reinforcement Learning Over Wireless Cellular Networks", *IEEE International Conference on Communications (ICC)*, Seoul, South Korea, May 2022.

P11 **F. Lotfi** and O. Semiari, "Performance Analysis and Optimization of Uplink Cellular Networks with Flexible Frame Structure", *IEEE 93rd Vehicular Technology Conference (VTC2021-Spring)*, April 2021.