

Navid Reyhanian

U.S. Lawful Permanent Resident

Wireless Systems Engineer in Cisco's Product Group of Enterprise Networking (Grade 8)

Google Scholar LinkedIn

✉ navid.reyhanian@gmail.com

☎ 612-458-9881

Website

Background

- Advanced signal processing expert specializing in digital/analog precoding, and optimization for next-generation wireless systems. Designed algorithms for multi-user MIMO-OFDM, satellite-terrestrial, and RIS-assisted architectures, and developed innovative localization solutions using GNSS, Wi-Fi, BLE, FTM, UWB, and AoA/PDoA. Adept at hands-on debugging of codes and systems to overcome real-world challenges.

Education

- **University of Minnesota, Twin-Cities** MN, USA
Ph.D. in Electrical Engineering (GPA: 3.96/4) 2016 – 2022
 - **Dissertation:** New Large-Scale Optimization Methods with Applications in Communication Networks and Medical Imaging
 - **Advisor:** PROF. ZHI-QUAN LUO
- **University of Minnesota, Twin-Cities** MN, USA
M.Sc. in Electrical Engineering (GPA: 3.96/4) 2016 – 2019
- **University of Tehran** Tehran, Iran
M.Sc. in Electrical Engineering (GPA: 16.91/20) 2012 – 2015
 - **Advisors:** Prof. Behrouz MAHAM and Prof. Vahid SHAH-MANSOURI
- **Technical University of Munich (TUM)** Munich, Germany
Visiting Researcher for Master's Thesis 2014 – 2015
- **Iran University of Science & Technology (IUST)** Tehran, Iran
B.Sc. in Electrical Engineering, Communications 2008 – 2012

Work Experience

- **Cisco Systems, Inc.** June 2022 – present
Wireless Systems Engineer in the Product Group of Enterprise Networking (Grade 8) Milpitas, CA
 - **Topic:** Advanced Development of Signal Processing Algorithms for Wireless Networks
 - * Designed and developed an advanced GNSS receiver leveraging a Kalman filter combined with raw pseudo-range measurements, employing Gauss-Newton optimization techniques for enhanced positioning accuracy and robustness.
 - * Created and implemented novel algorithms for real-time localization of Access Points (APs) by jointly processing Fine Time Measurement (FTM) data and GNSS signals, enabling dynamic tracking and precise geolocation.
 - * Developed a robust Angle of Arrival (AoA) estimation framework using Phase Difference of Arrival (PDoA) measurements on AP antennas, integrating sophisticated phase unwrapping methods with memory techniques and effective ambiguity resolution to significantly enhance client/tag localization accuracy.
 - * Conducted detailed RF impairment analysis of transmit front-end modules, including systematic filtering, tuning, and adaptive power control strategies to ensure compliance with stringent FTM ranging accuracy and performance requirements.
 - * Designed and implemented robust clustering algorithms for AP grouping, complemented by an Ultra-Wideband (UWB)-based client positioning engine optimized for downlink Time Difference of Arrival (TDoA) networks, enhancing scalability and localization precision.
 - * Led the design and development of an uplink TDoA tag positioning system, integrating multiple synchronization techniques to address timing and drift challenges, substantially improving the reliability and accuracy of client localization.
 - * Developed and optimized block coordinate descent algorithms tailored for solving large-scale, rank-constrained anchor-free optimization problems, significantly improving AP localization accuracy in GPS-denied network environments.
 - * Hands-on performance testing on Wi-Fi, BLE, and UWB-enabled devices, focusing on real-time throughput, coverage, and reliability metrics to ensure strict QoS and regulatory compliance. Extensive experience debugging and maintaining complex C/C++ and Python codebases for complex systems, including memory optimization and performance tuning to meet strict latency requirements in wireless communication stacks..
 - **Implementations:** Code developed/maintained in C/C++ and Python, executed on Cisco Spaces (cloud).

Internship

- **Sabre Corporation** May. 2019 – Aug. 2019
Operations Research Analyst Southlake, Texas
 - **Topic:** Developing distributed and scalable large-scale optimization algorithms for airline scheduling
 - **Method:** ADMM algorithm with a warm start, where subproblems are linearized and solved via away-steps Frank-Wolfe

Research Experience

- **Joint Spatial and Spectral Beamforming for Hybrid mmWave Multi-User MIMO-OFDM Systems** [Paper]
 - Developed hybrid digital-analog precoding for mmWave systems; created joint spatial-spectral precoding to mitigate PAPR/out-of-band emissions; implemented true time delay (TDD)-assisted framework with TTD lines to counter beam squint; employed weighted MMSE-BCD with Riemannian gradient descent, ADMM, and bi-section search for non-convex optimization; validated superior sum-rate performance relative to classical methods through simulations
- **Coordinated Multipoint (CoMP) Transmission in Satellite-Terrestrial Networks**
 - Designed integrated CoMP framework combining satellite and terrestrial BSs; implemented MMSE-based approach with power/interference constraints; modeled signals with strict user interference limits; applied Markov multi-state channel modeling with memory; utilized Kalman filtering for CSI estimation; implemented adaptive CSI-driven beamforming for optimized performance
- **Uplink Sum-Rate Maximization in RIS-Assisted CF-mMIMO-OFDM Networks**
 - Designed joint optimization of UE precoding, RIS coefficients, and AP combining matrices; incorporated IQ imbalance at UEs/APs for realistic modeling; implemented WMMSE-based BCD for non-convex problem-solving; developed specialized solutions using bisection methods (UE precoders), closed-form expressions (AP combiners), and GPM with adaptive step-size (RIS coefficients); provided convergence guarantees and demonstrated performance improvements over decoupled methods

Patents

- 10 internally approved, 1 granted

Submitted and In-Preparation Journal Papers

- **N. Reyhanian**, R. Ghaderi and Z.-Q. Luo, “Joint Spatial and Spectral Hybrid Precoding For MU-MIMO-OFDM Systems with True Time Delays,” to be submitted 2025

Accepted Journal Papers

- **N. Reyhanian** and Z.-Q. Luo, “Data-Driven Adaptive Network Slicing for Multi-Tenant Networks,” in IEEE Journal of Selected Topics in Signal Processing, vol. 16, no. 1, pp. 113-128, Jan. 2022 [Here](#)
- **N. Reyhanian**, H. Farmanbar, and Z.-Q. Luo, “Resource Reservation in Backhaul and Radio Access Network with Uncertain User Demands,” accepted in IEEE Transactions on Vehicular Technology, 2022 [Online] available: [Here](#)
- **N. Reyhanian**, B. Maham, “Energy-Aware Scheduling for Broadcast Erasure Channels With Two Energy Harvesting Receivers,” in IEEE Transactions on Green Communications and Networking, vol. 4, no. 4, pp. 1174-1187, Dec. 2020 [Here](#)
- M. Razaviyayn, M. Hong, **N. Reyhanian**, and Z.-Q. Luo, “A linearly convergent doubly stochastic Gauss–Seidel algorithm for solving linear equations and a certain class of over-parameterized optimization problems,” Mathematical Programming, Springer, 2019 [Here](#)
- **N. Reyhanian**, B. Maham, V. Shah-Mansouri, W. Tushar, and C. Yuen, “Game-Theoretic Approaches for Energy Cooperation in Energy Harvesting Small Cell Networks,” IEEE Transactions on Vehicular Technology, vol. 66, no. 8, pp. 7178–7194, Aug. 2017 [Online] available: [Here](#)

Conference Papers

- **N. Reyhanian**, M. Mullen, T. Froelich, M. Garwood and J. Haupt, “Guided Joint Image and Fieldmap Estimation in the Presence of Field Inhomogeneity”, in Proc. International Society of Magnetic Resonance in Medicine Annual Meeting & Exhibition, Jun. 2023
- **N. Reyhanian** and Z.-Q. Luo, “Data-Driven Optimized Slice Activation in Multi-Tenant 5G Networks,” in Proc. Asilomar Conference on Signals, Systems, and Computers, Nov. 2021
- **N. Reyhanian**, H. Farmanbar, and Z.-Q. Luo, “Data-Driven Adaptive Network Resource Slicing for Multi-Tenant Networks,” in Proc. 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)
- **N. Reyhanian**, and B. Maham, “Statistical Slice Selection in Multi-Tenant Networks with Maximum Isolation of Reserved Resources,” in Proc. Asilomar Conference on Signals, Systems, and Computers, Nov. 2020
- **N. Reyhanian**, H. Farmanbar, and Z.-Q. Luo, “Resource reservation in backhaul and radio access network with uncertain user demands,” in Proc. IEEE 21st International Workshop on Signal Processing Advances in Wireless Communications (IEEE SPAWC), May 2020
- **N. Reyhanian**, H. Farmanbar, S. Mohajer, and Z.-Q. Luo “Resource provisioning for virtual network function deployment with in-subnetwork processing,” in Proc. IEEE 21st International Workshop on Signal Processing Advances in Wireless Communications (IEEE SPAWC), May 2020

- **N. Reyhanian**, H. Farmanbar, S. Mohajer, and Z.-Q. Luo, “Joint Resource Allocation and Routing for Service Function Chaining with In-Subnetwork Processing,” in Proc. International Conference on Acoustics, Speech and Signal Processing (ICASSP), May 2020
- **N. Reyhanian**, B. Maham, and G. Nauryzbayev, “Energy-Aware Scheduling for Broadcast Erasure Channels with Three Energy Harvesting Receivers,” in Proc. 12th International Symposium on Communication Systems, Networks and Digital Signal Processing (CSNDSP), Aug. 2020
- **N. Reyhanian**, B. Maham, V. Shah-Mansouri and C. Yuen, “Double-Auction-Based Energy Trading for Small Cell Networks with Energy Harvesting,” in Proc. IEEE International Conference on Communications (IEEE ICC), Kuala Lumpur, Jun. 2016
- **N. Reyhanian**, B. Maham, V. Shah-Mansouri and C. Yuen, “A Matching-Game-Based Energy Trading for Small Cell Networks with Energy Harvesting,” in Proc. IEEE 26th Personal, Indoor and Mobile Radio Communications Conference (IEEE PIMRC), Hong Kong, Sept. 2015
- **N. Reyhanian**, V. Shah-Mansouri, B. Maham and C. Yuen, “Renewable Energy Distribution in Cooperative Cellular Networks with Energy Harvesting,” in Proc. IEEE 26th Personal, Indoor and Mobile Radio Communications Conference (IEEE PIMRC), Hong Kong, Sept. 2015
- **N. Reyhanian**, B. Maham and C. Yuen, “Optimal Scheduling for Broadcast Erasure Channels with Energy Harvesting Receivers,” in Proc. IEEE International Conference on Communications (IEEE ICC), Workshop on Green Communications and Networks, London, UK, Jun. 2015
- M. Heindlmaier, **N. Reyhanian**, and S. Saeedi Bidokhti, “Capacity Regions of Two-Receiver Broadcast Packet Erasure Channels with Feedback and Memory,” in Proc. Information Theory and Applications Workshop, Feb. 2015
- M. Heindlmaier, **N. Reyhanian**, and S. Saeedi Bidokhti, “On the Capacity Region of the Two-User Broadcast Packet Erasure Channel with Feedback and Memory,” in Proc. IEEE 52nd Annual Communication, Control, and Computing (Allerton), Oct. 2014

Honors and Awards

- Cisco wireless star
- Department Fellowship of University of Minnesota, USA- Fall 2016-Spring 2017
- Honorary admission for Master’s Degree studies in Iran University of Technology 2012
- Ranked 81st in the nationwide MS.c. entrance exam in electrical engineering, spring 2012

Graduate Courses

- Introduction to Nonlinear Optimization, Probability and Stochastic Process, Convex Optimization Theory, Detection and Estimation Theory, Matrix Theory, Linear Programming and Combinatorial Optimization, Artificial Intelligence II, Introduction to Machine Learning, Machine Learning, Optimization, Data Communication Networks, Coding Theory, Wireless Communications, Game Theory, Advanced Communication Networks, Optimal Control, Stochastic Processes, Digital Signal Processing, Advanced Communication Theory, Multi-User Information Theory

Licenses & Certifications

- **Coursera:** Neural Networks and Deep Learning, Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization, Structuring Machine Learning Projects, Natural Language Processing in TensorFlow, Convolutional Neural Networks, Sequence Models

Professional Services

- Session Chair for IEEE SPAWC 2020, IEEE Asilomar 2020
- Active reviewer for IEEE TCOM, IEEE TVT, IEEE ICC, IEEE ISIT

Skills Summary

- **Languages:** Python (Numpy, Scipy, Sklearn, and TensorFlow), C/C++, L^AT_EX, Assembly
- **Softwares:** MATLAB, CVX, Gurobi, Simulink, Multi-Threading, OpenMPI, CUDA, OrCAD schematic capture & PCB layout, and Microsoft Office (Word, Powerpoint, Visio, Excel)
- **Operating Systems:** MacOS, Linux, Windows
- **Lab Skills:** Fixed-Point Arithmetic , Digital/Analog Scopes, Spectrum Analyzer, Function Generators
- **Soft Skills:** Leadership, strong verbal and written communication skills, excellent troubleshooting and debugging skills, excellent problem solving skills, excellent teams skills

References

Will be provided upon request.