Kasra Fallah

Ph.D. Candidate, Electrical Engineering
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Objective

Doctoral researcher in Electrical Engineering specializing in sequential decision-making under uncertainty. Strong background in stochastic dynamical systems, model-free reinforcement learning, and optimization. Experienced in analyzing noisy time-series systems, establishing theoretical guarantees, and designing algorithms for learning and control. Seeking to advance research at the intersection of stochastic modeling, decision-making, and data-driven optimization.

Education

Columbia University, New York, USA 2024 – Present
Ph.D. in Electrical Engineering (GPA: 3.998/4.0) *Advisor: Prof. James Anderson*

Passed Doctoral Qualifying Exam with high distinction (Signals, Systems, Communications).

Research areas: Sequential Decision-Making, Learning for Control, Stochastic Processes, Optimization.

Selected Coursework: GR5400 Non-Linear Option Pricing; E6876 Sparse & Low-Dimensional Models for High-Dimensional Data; STCS6701 Probabilistic Models in Machine Learning

University of Waterloo, Waterloo, Canada 2022 – 2024
M.A.Sc. in Electrical Engineering (GPA: 4.0/4.0) *Advisor: Prof. Ravi Mazumdar*

Thesis: *On the Calculation of Mutual Information for Channels with Gauss-Markov Noise.*

Selected Coursework: Advanced Stochastic Process; Advanced Convex Optimization; Stochastic Filtering.

Sharif University of Technology, Tehran, Iran 2018 – 2022
B.Sc. in Electrical Engineering (GPA: 3.95/4.0, Rank: 13)

Awarded admission without entry exam through the National Elite Foundation program.

Selected Coursework: Stochastic Process; Wireless Communication; Data Networks.

Young Scholars Club, Tehran, Iran 2017 – 2018
International Physics Olympiad (IPHO) Training Program

Subjects: Classical Mechanics; Relativity; Electromagnetism; Thermodynamics.

Publications

- **K. Fallah**, L. Toso, J. Anderson, "On the Gradient Domination of the LQG Problem," *Under review at IEEE Transactions on Automatic Control*, 2025.
- **K. Fallah***, L. Toso*, J. Anderson, "Adversarially Robust Multitask Adaptive Control," *Submitted to L4DC*, 2026.
- **K. Fallah***, E. Zabeh*, *From Fields to Manifolds: An Analytical Framework for LFP Population Analysis via Lag Embedding*, *ICML 2026* (under review), 2026.
- **K. Fallah**, "On the Calculation of Mutual Information for Channels with Gauss-Markov Noise," *M.A.Sc. Thesis, University of Waterloo*, 2024.

Awards and Honors

- PhD Graduate Studies Fellowship, Columbia university, 2024
- Xuemin Shen Graduate Scholarship in Telecommunication, 2023
- International Master's Award of Excellence (CAD 7500), 2022 & 2023
- Graduate Research Scholarship (CAD 64,000)
- Member, National Elite Foundation of Iran, 2017–2022
- Gold Medalist, 30th National Physics Olympiad (2017)
- Gold Medalist, National Robocop Olympiad (2015)

Research Experience

Ph.D. Researcher 2024 – Present
Columbia University *Supervisor: Prof. James Anderson*

Developing gradient-based algorithms for LQG control with provable guarantees.

Regret analysis for federated/multi-agent control systems.

Exploring manifold representations for learning-based control.

Research Assistant 2022 – 2024
University of Waterloo *Supervisor: Prof. Ravi Mazumdar*

Research on stochastic filtering, mutual information, convex optimization, and measure-theoretic probability.

Internship Jul 2021 – Sep 2022
MCI Lab (Mobile Telecommunication Co. of Iran) *Supervisor: Dr. M. Fakharzadeh*

Utilized SDR bladeRF on Matlab/Simulink and GNU Radio for channel simulation.

Analyzed and tested mmWave Tx/Rx for 30 GHz commercial 5G systems.

R&D Intern May 2021 – Sep 2021
Telecommunication Company of Iran (TCI)

Investigated switching and traffic optimization via simulations in Python and Matlab.

Teaching Experience

Head Teaching Assistant 2024 -2025
Columbia University

EEME E6601 Intro to Control Theory, E6602 Modern Control Theory

Head Teaching Assistant 2023
Waterloo University

ECE 307 Probability Theory and Statistics 2

Head Teaching Assistant 2019 – 2022
Sharif University of Technology

Signal and Systems, Electric Circuits, Numerical Calculations, Engineering Math

Designed assignments, held tutorials, supervised labs, graded exams and homeworks.

Olympiad Tutor 2017 – 2022
Young Scholars Club and high schools

Service

- **Journal Reviewer:** IEEE Transactions on Information Theory; IEEE Transactions on Automatic Control (TAC); IEEE Control Systems Letters (L-CSS).
- **Conference Reviewer:** IEEE Conference on Decision and Control (CDC); American Control Conference (ACC); Learning for Dynamics & Control (L4DC); NeurIPS .

Languages

- English (full professional), Persian/Farsi (native), Gilaki (bilingual).

Technical Skills

- **Python:** NumPy, SciPy, Matplotlib, Pandas, JAX, PyTorch, PyTorch Lightning, multiprocessing, multithreading, object-oriented programming, time-series processing, scientific computing, GPU-accelerated training.
- **Machine Learning / Optimization:** PyTorch autograd, stochastic gradient methods, reinforcement learning toolkits, convex optimization (CVX, CVXPY), custom differentiable simulators, numerical optimization algorithms.
- **MATLAB & Simulink:** Real-time signal processing, control system modelling, MPC, system identification, neural networks, communication system simulation.
- **C & C++:** OOP, template programming, low-level performance optimization, socket programming, NS-3 simulation environments.
- **Other Software:** Git, Linux shell scripting, LaTeX, Altium Designer, AutoCAD.