# Kasra Fallah

Ph.D. Candidate, Electrical Engineering
Columbia University, New York, USA

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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: 4.05/4.0)* *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**$^*$, H. N. Chen, R. Singha, E. Kong, G. Turi, A. Losonczy, E. Zabeh$^*$, "Neural-FieldManifold: Reconstruction of LFP Manifold with Lag Embedding," *Submitted to ICML*, 2026.
- **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**$^\star$, L. Toso$^\star$, J. Anderson, "Adversarially Robust Multitask Adaptive Control," *L4DC*, 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)
- Gold Medalist, 30th National Physics Olympiad (2017)

## 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.