

Alisina Bayati

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Research Summary

Ph.D. candidate at the Coordinated Science Lab (CSL), University of Illinois Urbana-Champaign, with a strong background in mathematics and core research interests in control theory, optimization, sequential decision making, reinforcement learning, and multi-agent systems. My work focuses on developing scalable algorithms for safety-aware coordination, sparse learning with evolving data, and resource allocation under physical and structural constraints.

Education

Ph.D. in Mechanical Science and Engineering, UIUC 2020–2027 (Expected)

GPA: 3.90/4.00

Advisor: Dr. Srinivasa Salapaka

Relevant Coursework: Statistical RL, Machine Learning, Control Theory, Optimization, Dynamic Programming, Mathematical Methods, Computer Vision

M.S. in Mathematics, UIUC 2021–2025 (Expected)

GPA: 3.90/4.00

Relevant Coursework: Real Analysis, Functional Analysis, Nonlinear Systems, Probability, Random Processes, Optimization by Vector Space methods, Optimal Control Theory

B.S. in Mechanical Engineering, Sharif University of Technology 2015–2019

GPA: 18.10/20.0 (3.89/4.00)

Advisor: Dr. Hamed Moradi

Publications

Submitted and Preprints

- **A. Bayati**[†], D. Tiwary[†], S. Salapaka. *A control barrier function approach to constrained resource allocation problems in a maximum entropy principle framework*. Submitted to **IEEE CDC 2025**. arXiv:2504.01378
- S. Basiri, **A. Bayati**, S. Salapaka. *Orthogonal nonnegative matrix factorization with sparsity constraints*. Submitted to **IEEE CDC 2025**. arXiv:2210.02672
- **A. Bayati**, A. Srivastava, V. Mundada, S. Salapaka, H. Feng, A. Malvandi. *Enhancing energy efficiency in industrial drying via non-thermal dehydration with ultrasonic waves and an innovative dynamic optimization framework*. Under review, *Energy Conversion and Management*.
- A. Srivastava[†], **A. Bayati**[†]. *Sparse linear regression with constraints: A flexible entropy-based framework*. **IEEE ECC 2024**. PDF
- **A. Bayati**, A. Srivastava, A. Malvandi, H. Feng, S. Salapaka. *Towards efficient modularity in industrial drying: A combinatorial optimization viewpoint*. **IEEE ACC 2023**. PDF

In Preparation

- **A. Bayati**, A. Srivastava, S. Salapaka. *Sparse linear regression with evolving data: A control-based solution tracking approach*.
- **A. Bayati**, A. Srivastava, S. Salapaka. *Dynamic resource allocation in multi-agent systems under safety and mobility constraints*.

Research Projects

Safety-Aware Dynamic Resource Allocation, UIUC 2023–Present

Designed a control-theoretic framework for dynamic resource allocation among mobile agents subject to

safety and mobility constraints on lower-dimensional manifolds, with formal guarantees on collision avoidance and convergence.

Wireless Network Optimization, C-NICE, UIUC 2021–2024
Built a real-time digital twin for WiFi mesh networks using deep learning with permutation-invariant models; optimized router placement and user assignment.

Energy-Efficient Drying, US DOE, UIUC 2020–2024
Developed a mixed-integer dynamic optimization algorithm for a hybrid ultrasonic/convective drying system; experimentally validated energy efficiency improvements in lab-scale settings.

Sparse Regression with Dynamics, UIUC 2022–Present
Formulated a dynamic tracking method for sparse regression solutions under evolving data using control principles.

Notable Course Projects

Statistical Reinforcement Learning, UIUC Fall 2024
Reproduced and analyzed the theoretical foundations of adaptive control in LQ systems, based on *Abbasi-Yadkori & Szepesvári (2011)*. Focused on deriving key lemmas and algorithms leading to the $\tilde{O}(\sqrt{T})$ regret bound. [Report]

Computer Vision, UIUC Fall 2022
Deep learning-based facial keypoint detection under image corruption. [Report]

Honors and Awards

- "Teachers Ranked as Excellent," UIUC 2024
- Travel Grant, American Control Conference 2023
- First-Year Fellowship, UIUC MechSE 2020
- Top 0.2% among 182,000 in Iran's National University Entrance Exam 2015

Professional Experience

Reviewer, ACC, ECC, CDC 2024–Present
Reviewed submissions in optimization and control systems.

Teaching Assistant, UIUC 2023–Present
Courses: ME340 (Dynamics), TAM 210/211 (Statics). Rated "Excellent by Students."

Graduate Research Assistant, SENSIC Lab, UIUC 2022–Present
Worked on control, machine learning, and network optimization.

Undergraduate Researcher, Sharif Univ. 2018–2019
Designed optimal PID controllers for cancer treatment models to reduce drug side effects.

Skills

Programming: Python, MATLAB, C/C++, \LaTeX
Frameworks: NumPy, PyTorch, CVXPY, Simulink, OpenCV, SciPy, pandas
Languages: Persian (Native), English (Fluent), Arabic (Elementary)