

# Asal Mehradfar

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## EDUCATION

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<b>University of Southern California</b> Ph.D. in Electrical Engineering, GPA: 3.88/4, Advisor: Prof. Salman Avestimehr	Los Angeles, CA, US 2023–2027 (Expected)
<b>University of Southern California</b> M.Sc. in Electrical Engineering, GPA: 3.88/4, Advisor: Prof. Salman Avestimehr	Los Angeles, CA, US 2023–2025
<b>Sharif University of Technology</b> B.Sc. in Electrical Engineering, GPA: 18.05/20, Advisor: Prof. Mehrzad Namvar	Tehran, Iran 2017–2022
<b>Sharif University of Technology</b> B.Sc. in Computer Science, GPA: 18.05/20, Advisor: Prof. Shahram Khazaei	Tehran, Iran 2019–2022

## RESEARCH EXPERIENCE

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### AI-Assisted Analog and Radio-Frequency Circuit Design (Fall 2023 - now)

- Developing large-scale datasets and benchmarks to evaluate ML models for analog and RF circuit design, spanning both basic and advanced topologies. [3], [6]
- Building the first end-to-end, layout-aware AI pipeline for analog circuit design. [2]
- Designing graph-based representations to capture spatial and topological properties of circuits, enabling generalizable and interpretable ML models. [2]
- Designing language model agents to help non-experts specify design intents via natural language.
- Developing generative models to propose novel circuit topologies conditioned on design constraints.

### Lipid Generation and Analysis for Drug Discovery (Fall 2023 - now)

- Developing predictive models for key properties of large molecules, including toxicity, melting point, and lipid nanoparticle (LNP) transfection efficiency, using transformers and graph neural networks. [1]
- Building a generative pipeline for designing lipids with high transfection efficiency and desirable physicochemical properties.

### Time Series Prediction (Fall 2024 - now)

- Developing novel state space model (SSM) architectures for accurate and robust financial market prediction. [4]
- Incorporating sentiment analysis and natural language processing (NLP) techniques to enhance feature representation for time series forecasting.

## LLM Router (Fall 2024 - Spring 2025)

- Leveraging uncertainty estimation to enable confidence-aware routing across multiple LLMs. [5]
- Exploring multilingual routing strategies to support diverse language inputs across specialized LLMs.

## Action Detector for Resource-Constrained Devices (Fall 2020 - Summer 2021)

- Developing an action recognition system optimized for devices with limited computational resources (edge devices).
- Designing a multi-camera tracking system for robust human detection.

## CONFERENCE REVIEW

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| • AI for Science Workshop @ NeurIPS                             | 2025 |
| • Machine Learning and the Physical Sciences Workshop @ NeurIPS | 2025 |
| • Machine Learning and the Physical Sciences Workshop @ NeurIPS | 2024 |

## SKILLS

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- **Programming Languages:** Python, MATLAB, C/C++, JAVA
- **Machine Learning Libraries (Python):** PyTorch, TensorFlow, scikit-learn
- **Others:** Microsoft Office, L<sup>A</sup>T<sub>E</sub>X

## HONOR AND AWARDS

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| • Qualcomm Innovation Fellowship Finalist  | 2025 |
| • Reproducibility Award at Machine Learning and the Physical Sciences Workshop @ NeurIPS | 2024 |
| • Annenberg Graduate Fellowship @ USC  | 2023 |

## PUBLICATIONS

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- [1] **A. Mehradfar**, M. S. Sepehri, J. M. Hernandez-Lobato, G. S. Kwon, S. A. Mahdi Soltanolkotabi, and M. Rasoulianboroujeni, “LANTERN: A Machine Learning Framework for Lipid Nanoparticle Transfection Efficiency Prediction”, *arXiv preprint arXiv:2507.03209*, 2025.
- [2] **A. Mehradfar**, X. Zhao, Y. Huang, E. Ceyani, Y. Yang, S. Han, H. Aghasi, and S. Avestimehr, “FALCON: An ML Framework for Fully Automated Layout-Constrained Analog Circuit Design”, *The Thirty-ninth Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2025.
- [3] **A. Mehradfar**, X. Zhao, Y. Niu, S. Babakniya, M. Alesheikh, H. Aghasi, and S. Avestimehr, “Supervised Learning for Analog and RF Circuit Design: Benchmarks and Comparative Insights”, *arXiv preprint arXiv:2501.11839*, 2025.
- [4] M. S. Sepehri\*, **A. Mehradfar\***, M. Soltanolkotabi, and S. Avestimehr, “CryptoMamba: Leveraging State Space Models for Accurate Bitcoin Price Prediction”, *IEEE International Conference on Blockchain and Cryptocurrency (ICBC)*, 2025.
- [5] T. Zhang\*, **A. Mehradfar\***, D. Dimitriadis, and S. Avestimehr, “Leveraging Uncertainty Estimation for Efficient LLM Routing”, *Collaborative and Federated Agentic Workflows Workshop @ ICML*, 2025.
- [6] **A. Mehradfar**, X. Zhao, Y. Niu, S. Babakniya, M. Alesheikh, H. Aghasi, and S. Avestimehr, “AICircuit: A Multi-Level Dataset and Benchmark for AI-Driven Analog Integrated Circuit Design”, *Machine Learning and the Physical Sciences Workshop @ NeurIPS*, 2024.