

# REZA ALVANDI

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## RESEARCH INTERESTS

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- Reinforcement Learning
- Optimization and Algorithms
- Stochastic Control
- High-Dimensional Statistics

## EDUCATION

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### McGill University | Mila (Quebec AI Institute)

Montreal, Canada

- Master of Science, **Electrical Engineering**  
CGPA: 4.00/4.00  
Supervisors: Prof. Aditya Mahajan and Prof. Peter Caines

Jan 2025 – Present

### Sharif University of Technology

Tehran, Iran

- Bachelor of Science, **Computer Science**  
CGPA: 18.02/20.00

Sep. 2019 – Feb. 2024

### Shahid Ejei High School (NODET)

Isfahan, Iran

- Higher Secondary Education, **Mathematics and Physics**

2015 – 2018

## RESEARCH EXPERIENCES & AFFILIATIONS

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### McGill University | Mila (Quebec AI Institute)

- **Reward Concentration Results in MDPs** Jul. 2025 - Present  
Supervisors: Prof. Peter Caines and Prof. Aditya Mahajan
  - Affiliated with Mila (Quebec AI Institute), focusing on foundational research in Stochastic Control and Reinforcement Learning (RL).
  - Investigating concentration bounds for Markov Decision Processes (MDPs) to establish improved theoretical performance guarantees.
  - Developing novel analytical techniques (e.g., martingale methods) for probability concentration, which enhances the reliability of sequential decision-making algorithms.

### Sharif University of Technology

- **Graph Machine Learning (Bachelor's Project)** Dec. 2022 - Feb. 2024  
Supervisor: Prof. Javad Ebrahimi
  - Designed and constructed a novel graph dataset from proprietary company data, enabling structural analysis for a complex real-world network problem.
  - Implemented and benchmarked state-of-the-art GNNs (e.g., GAT, GCN) against traditional spectral methods (e.g., Spectral Clustering) to identify optimal architectures for classification/prediction.
  - Provided robust baselines and analysis, demonstrating the comparative performance of deep learning vs. traditional techniques for high-dimensional graph data.

## SELECTED ADVANCED COURSES

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- **Graduate Courses:** Machine Learning, Reinforcement Learning, Stochastic Control, Linear Control, Graph Machine Learning<sup>†</sup>, Convex Optimization, Game Theory, Probabilistic Machine Learning<sup>†</sup>, Advanced Algorithm Design, Advanced Probability, Stochastic Processes
- **Undergraduate Courses:** Database Systems, Introduction to Network Systems, Advanced Programming, Image Processing, Artificial Intelligence, Operating Systems, Numerical Analysis, Introduction to Simulation, Introduction to Cryptography

<sup>†</sup> Audited

## SKILLS

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- **Language Proficiency:** English, French, Persian

- **Programming:** Python (OpenCV, NumPy, Pandas, Scikit-learn, PyTorch, TensorFlow, Keras, etc.), C, Java, R, Matlab, HTML/CSS, JavaScript, FastAPI, Django, Spark
- **Document Creation:** L<sup>A</sup>T<sub>E</sub>X, Microsoft Office, Markdown, Photoshop
- **Operating Systems:** Linux, Windows

## TEACHING EXPERIENCES

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- **Head Teaching Assistant:** Discrete Mathematics (Spring 2022)
- **Teaching Assistant:** Introduction to Software Systems (Fall 2025), Database Systems (Winter 2026), Operations Research (Spring 2024), Machine Learning (Spring 2023), Fundamentals of Programming (Spring 2023), Statistics (Spring 2022, 2023), Advanced Programming (Fall 2022)

## SELECTED ADVANCED COURSE PROJECTS

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- **Active Contours for Object Detection** [code repository and results]  
Active Contours (Snakes) for object detection. Define an energy functional comprising internal and external energies, iteratively minimize the energy function using Dynamic Programming to deform the contour towards the object boundaries.
- **Adversarial Search Board game player** [code repository and detail]  
Using Minimax with Alpha-Beta Pruning and Heuristic Evaluation Functions to design an agent that can win board games.
- **Autonomous Precision: Deep Q Learning Mastery in Spaceship Simulator Landings** [code repository and details]  
I designed a Deep Q Learning algorithm that adeptly lands a spaceship in a simulator, showcasing efficient autonomous navigation and control.
- **Image blending (Gradient Domain Blending)** [code repository and results]  
using a carefully designed mask to extract pixel values from the first image and image derivatives from the second image. Utilized sparse methods to efficiently solve the resulting large-scale linear system, resulting in visually captivating compositions.
- **Vehicle-insurance-simulation** [code repository and detail]  
Created a simulation model for a vehicle insurance organization, optimizing staffing and queuing to enhance the process efficiency. Analyzed event types, service time distributions, and queuing discipline to inform decision-making.
- **TweetGram social media in java** [code repository and detail]  
Designed Java-based social media 'TweetGram' (20k+ lines), merging Twitter features, Telegram-like bots, and group chats in a server-client setup. Demonstrates extensive coding proficiency.
- **Cluster system computation server in java** [code repository and detail]  
Developed a cluster system to distribute computations across multiple worker servers. Utilized caching for efficient task handling, parallel processing, and load distribution through a centralized server, showcasing expertise in distributed computing and optimization.

## ACHIEVEMENTS

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- McGill Excellence Fellowship Award
- Accepted at the first-ranked university in Iran with a fully funded scholarship
- Ranked 4th in the Department of Chemical Engineering in the 2019/2020 academic year
- Being among the top 12 individuals who were accepted into the Exceptional Talents High School with fully funded scholarships from a pool of about 10,000 participants