

Soheil Sayah Varg

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Education

Sharif University of Technology

B.Sc. in Computer Engineering

Tehran, Iran

Sep 2023 – Jul 2027

- **Cumulative GPA: 19.38 / 20.0**, ranked **14th** of 186 students. Departmental average for this cohort: **17.24**. University-wide: 15.85.
- Awarded 7 credits in physics and admitted without entrance exam, both under the National Olympiad medalist provision.

AE High School

Diploma, Mathematics & Physics

Tehran, Iran

Sep 2020 – Jun 2023

- GPA: 19.25 / 20.0

Honors and Awards

2023: Gold Medal, Iranian National Physics Olympiad — ranked **7th** nationwide among more than 10,000 participants, and **2nd** nationwide in the experimental (laboratory) examination.

Research Interests

- Large Language Models
- Bandits
- Machine Learning
- ML Theory
- Reinforcement Learning
- RL Theory
- Optimization
- Probability & Statistics
- Stochastic Processes

Research Experience

Data Science & Machine Learning Laboratory (DML), Sharif University of Technology

Exact Controlled Generation from Tilted Autoregressive Targets

Dec 2025 – Present

- Supervised by **Dr. Ali Rostami** (Ph.D. Computer Science, UC Irvine, 2024). A sampling scheme that draws from a reward-tilted language-model distribution *exactly in distribution* rather than approximately, via a particle-Gibbs ladder over a batched proposal chain.
- Measured the design's assumed noise-scaling rate directly across a $32\times$ range of sequence lengths and re-anchored it on the measured rate.
- **First-author manuscript in preparation.**

Graduate Deep RL project, team of 3, Sharif University of Technology

Model-Based Reinforcement Learning in Confounded POMDPs

Feb 2026 – Aug 2026

- Completed and presented an empirical implementation of Hong, Qi & Xu (ICML 2024), a theory-only paper with no released code: bridge-function identification from negative-control proxies, verified against an analytic oracle to machine precision. At full benchmark scale the **confounding-blind baseline wins in all 15 sweep cells** — estimation variance dominates the bias the method removes.
- *Role in the team of three*: read the two anchor papers and drove the implementation.

May 2026 – Present: Bandit literature review, under the guidance of Dr. Amir Najafi — batched bandits, privacy-constrained linear bandits, misspecified kernelized bandit optimization. No project or manuscript yet.

Selected Projects

Game Theory: War of Attrition under Uncertainty — Python, PyTorch

🌐 repo

- Bayesian type filtering and potential-based reward shaping for a multi-stage war of attrition with incomplete information; behavioural features and self-play evaluation.

Information Retrieval: Modern Information Retrieval System — Python, PyTorch, FAISS

🌐 repo

- SPLADE + dense retrieval fused by reciprocal rank fusion, cross-encoder reranking, QLoRA fine-tuning for generation.

Deep RL: Segmentation and Deep RL — Python, PyTorch

🌐 repo

- Attention U-Net variants for road segmentation and Soft Actor-Critic for continuous control, built from scratch in PyTorch.

Optimization: Convex Optimization Algorithms — Python, NumPy, CVXPY

🌐 repo

- Chambolle-Pock and ADMM implemented from their update rules; ADMM matches CVXPY to 0.02 dB PSNR in 0.2 s.

Applied Probability: Market Predictability Study — Python, statsmodels

🌐 repo

- Showed the claimed signal was a multiple-comparisons artifact; a coin flip reproduced its Sharpe ratio.

Systems: NeoGit — a version control system in C

 repo

- Git-like CLI on raw POSIX file I/O: staging, commits, branching, merge, stashing, pre-commit hooks.

Teaching Experience

Sharif University of Technology

Teaching Assistant

2024 – 2026

- **Head TA**, Signals & Systems (Dr. Manzuri, Spring 2026) — coordinated the teaching staff for a 60-student core course.
- Stochastic Processes and Engineering Probability & Statistics (Dr. Najafi)
- Machine Learning and Probability & Statistics (Dr. Sharifi-Zarchi)
- Linear Algebra, twice (Dr. Rabiee & Dr. Ramezani)
- Logic Design (Dr. Hessabi & Dr. Arshadi)
- Data Structures & Algorithms (Dr. Abam)
- Fundamentals of Programming (Dr. Rivadeh)

Ten course-semesters across five terms in total.

Aug 2023 – Present: Co-founder and physics instructor, Resonance (resonanceoly.ir) — an online Physics Olympiad school, started as a small study group, reaching students who have no selective high school near them. Teach the mechanics, electromagnetics and laboratory tracks, and write problem sets and mock exams for the national selection rounds.

2022 – Present: Physics Olympiad instructor, theory and **experimental / laboratory** tracks — core olympiad staff at **Allameh Helli 3** (NODET, Iran's national programme for exceptional talents) and instructor at AE High School. Also introductory Python at AE Middle School and lower-secondary physics at Mahdavi School.

Leadership and Activities

May 2025: Juror, 13th Persian Young Naturalists' Tournament (PYNT), Tehran — an IYPT-format research tournament run by the Ariaian Young Innovative Minds Institute under the World Federation of Physics Competitions. Judged team defenses of open-ended physics research problems.

2024 – 2025: Deputy Chairman, CEI 2024 (Computer Engineering Introduction event) • **Head of Purchase**, WSS 11 (Winter Seminar Series) • Sponsorship Staff, WSS 10.

2023 – 2025: Head of Purchase & Scientific Staff, Bugsbuzzy game development contest • Executive Staff, ICPC 2023 & 2025 • Rayan AI 2024.

Selected Coursework ([†] graduate-level)

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| ○ Stochastic Processes [†] (20.0) | ○ Probability & Statistics (20.0) |
| ○ Machine Learning (20.0) | ○ Computer Simulation (20.0) |
| ○ Artificial Intelligence (20.0) | ○ Numerical Computation (19.6) |
| ○ Convex Optimization I (19.5) | ○ Data Structures & Algorithms (20.0) |
| ○ Linear Algebra (20.0) | ○ Signals & Systems (20.0) |

Spring 2026: Reinforcement Learning[†], Modern Information Retrieval, Game Theory, Design of Algorithms, Database Design (*grades pending*).

Technical Skills

Languages: Python (proficient), C, C++, Java, SQL, MATLAB, $\LaTeX$

ML & Numerics: PyTorch, NumPy, SciPy, scikit-learn, statsmodels, pandas, Matplotlib, Hugging Face Transformers

Optimization & IR: CVXPY, FAISS, Gymnasium

Tools: Git, Linux, Docker, PostgreSQL, shell scripting, Proteus