Rozhina Shahbazi

Email: rozhinashahbazi@aut.ac.ir
GitHub: github.com/0Rorschach1

Education

Amirkabir University of Technology (AUT) — Tehran, IR
B.S. in Computer Science, GPA: 17.29/20 — 2022–Current

Farzanegan 1, National Organization for Development of Exceptional Talents (SAMPAD) — Isfahan, IR
Diploma in Mathematics and Physics, GPA: 18.11/20 — 2018 –2022

Achievements & Awards

- Among the Top 0.5% of My Country's High School Graduates — Summer 2022
  "Iran's National University Entrance Exam (Konkur) for Mathematics and Physics"
- Qualified for the 2nd Stage – INOI: Iranian National Informatics Olympiads — 2020–2021
  Iran's most prestigious pre-university competition
- Gold Medal (Individual) & Gold Medal (Team) – 12th Paya Scientific League — 2018–2019
  Computer Science, Grade: Middle School, Mashhad, Iran
- Finalist in Iran's 18th Tournament of Towns (A-Level) — 2020
  Organized by Isfahan Mathematics House
- Finalist in Iran's 17th Tournament of Towns (O-Level) — 2018 –2019
  Organized by Isfahan Mathematics House
- Silver Medal – International Mathematics Competition (IMC) — May 2018
  Organized by Tehran Mathematics House
- 3rd Place – National Math Olympiad for Young Talents — August 2019
  Organized by Tehran Mathematics House, Tehran, Iran
- 1st Place – 19th National Mathematics Workshop (Mehrgan) — 14–16 August 2019
  Isfahan, Iran
- 3rd Place in Middle School Level – FarzCode Programming Contest — May 2018
- Qualified for the semi-finals - International Olympiad "Formula of Unity" — 2017–2018

Teaching Experience

- **Head Teaching Assistant** at AUT (Tehran Polytechnic) — Fall 2025
  Introduction to Logic and Set Theory
- **Head Teaching Assistant** at AUT (Tehran Polytechnic) — Fall 2024
  Introduction to Theory of Computation
- **Instructor** at Isfahan Farzanegan 1 HighSchool — Summer 2022
  Combinatorics & Graph theory, Preparation for Informatics Olympiads (INOI)

Skills

- **Programming Languages:** C++, Python
- **IT & Networking:** Socket Programming, .NET, RESTful APIs, HTTP/HTTPS Protocols, TCP/IP, API Integration, WireShark, SSL/TLS Integration, iptables
- **Developer Tools: Git, Docker, Kubernetes**
- **AI:** PyTorch, scikit-learn, Hugging Face Transformers, OpenAI API, LangChain, Ollama

Languages

- **English:** Fluent
- **Persian:** Native

Projects

- MCP ChatBot 2025
  Developed an interactive chatbot using MCPAgent and LangChain with built-in conversation memory, enabling contextual multi-turn dialogues; integrated MCP servers for functionalities like time queries, filesystem operations, and Airbnb interactions, using asyncio for asynchronous execution and Ollama for local LLM processing.
- Sequential Modeling With RNNs and Transformers 2025
  Implemented RNN and Transformer models from scratch to tackle complex sequential tasks, developing a modular PyTorch Lightning training framework with systematic hyperparameter tuning. Applied advanced techniques such as custom positional encodings, KV-caching, and knowledge distillation, and solved algorithmic challenges like Palindrome Detection and Modular Summation with generalization and length extrapolation.
- Torch Replica 2025
  Designed and built a simplified version of PyTorch from scratch to explore core deep learning concepts. Implemented neural network architectures, layer operations, loss computation, and the training loop, including forward propagation, backpropagation, and gradient descent optimization. Built a computation graph and visualized decision boundaries for spiral datasets, including an animated demonstration of learning dynamics.
- Dimension Reduction 2025
  Implemented Isomap dimensionality reduction in Python for reconstructing a 2D map of Iranian cities from a precomputed distance matrix, using Classical MDS with double-centering, eigendecomposition, and manual rotations/reflections for orientation. Compared manual implementation to scikit-learn's Isomap, analyzing embedding similarities, parameter impacts, numerical stability, and noise resilience. Visualized results with matplotlib for geographic interpretation.
- Handwriting Recognition 2025
  Implemented Least Squares-based handwriting recognition for EMNIST Letters dataset in Python, building class matrices, computing QR decomposition with Householder reflections, and predicting test labels for evaluation. Extended to incremental updates via Givens rotations for efficient QR recomputation on new data, incorporating dynamic prediction during column additions to assess real-time accuracy improvements over the baseline model.
- CSP 2024
  Developed a Skyscraper Puzzle solver in Python using Constraint Satisfaction Programming (CSP), modeling with variables, domains, and constraints for uniqueness and visibility clues. Incorporated AI techniques like backtracking, MRV/LCV heuristics, and MAC for optimized solving. Built modular classes, tkinter GUI for visualization, and command-line customization.
- Theory of Computation Project 2023
  Developed C++ implementations for key automata theory conversions including Regex to NFA, Epsilon-NFA to NFA, and NFA to DFA, integrated with Graphviz for visual representations of finite automata structures.

- Space Invader 2023
  Developed a C++ recreation of the classic Space Invaders game using SFML for graphics and audio, featuring object-oriented design, real-time rendering, collision detection, enemy AI patterns, and finite state machine-based game states (e.g., menu, gameplay, game over) with high score tracking. Highlights skills in game development, event handling, multithreading, and performance optimization

Highlighted Courses

- **Introduction to Neural Networks and Deep Learning**
- **Artificial Intelligence & Workshop**
- **Linear Algebra in Data Science**
- **Numerical Linear Algebra**
- **Foundation of Matrix & Linear Algebra**
- **Compiler**
- **Theory of Computation**
- **Introduction to the Theory of Computation**
- **Introduction to Logic & Set Theory**
- **Foundation of Mathematics**
- **Graph Theory**
- **Foundation of Combinatorics**

Highlighted Courses

- **Principles of Software Design & Workshop**
- **Principles of Operating Systems**
- **Advanced Programming & Workshop**
- **Design & Analysis of Algorithms**
- **Data Structures & Algorithms**
- **Introduction to Probability**
- **Probability (I)**
- **Stochastic Processes (I)**
- **Time Series (I)**