

Amirali Sotoudeh

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EDUCATION

B.S. Computer Engineering

2021 – 2026 (*Expected*)

Iran University of Science and Technology (IUST), Tehran, Iran

GPA: 18.66/20

Rank 9 out of 128 students in the computer engineering department

Diploma of Mathematics and Physics Discipline

2018 – 2021

High School Diploma, Tehran

GPA: 19.55/20

RESEARCH INTERESTES

- Algorithmic Game Theory
- Mechanism Design
- Statistical Models
- Theoretical RL
- Learning Theory

RESEARCH INTERNSHIPS AND PROJECTS

Internship in Machine Learning

July 2024 – Sep 2024

Saarland University, Saarbrücken, Germany

Supervised by: *Prof. Michael Hahn*

- Explored theoretical foundations of transformer attention mechanisms, focusing on [Induction Heads](#) for sequence prediction.
- Investigated multi-layer, single-head models capable of replicating symbol patterns and maintaining sequence-following behaviors in token streams.
- Analyzed convergence properties and characterized minimizers of cross-entropy loss for induction tasks trained with gradient descent.
- Examined length generalization, establishing performance guarantees for sequences beyond training length.
- Extended recent research (e.g., [The Evolution of Statistical Induction Heads](#)) to address limitations and enhance insights into transformer interpretability.

Internship in Online Algorithms

May 2025 – Present

Massachusetts Institute of Technology (MIT), Massachusetts, USA

Supervised by: *Prof. Zijie Zhou*

- Studied the theoretical underpinnings of online algorithms for resource allocation with [reusable resources](#) under adversarial and stochastic inputs.
- Designed and analyzed competitive algorithms that account for resource recovery delays and temporal availability constraints.
- Developed models incorporating [time-window constraints](#), evaluating performance via competitive ratio and regret minimization frameworks.
- Characterized optimality conditions and derived lower bounds for online allocation with returnable resources using primal-dual and LP relaxation techniques.
- Extended recent work (e.g., [Reusable Resource Allocation: Beyond Worst-Case Analysis](#)) to improve algorithmic guarantees and address real-world scheduling scenarios.

ACHIEVEMENTS

Third Prize, European Mathematical Olympiad (EMC)	<i>2019</i>
Third-Degree Diploma, XVII Silk Road Mathematical Competition (SRMC), Kazakhstan	<i>2018</i>
Bronze Medal, Iran Mathematical Olympiad (MMO), Iran	<i>2017</i>

EXPERIENCE

Undergraduate Research Assistant *July 2023 – Feb 2023*
IPM Institute For Research In Fundamental Sciences, Tehran, Iran

- Researched online learning algorithms, gaining foundational knowledge in adaptive methods and decision-making under uncertainty.
- Authored an abstract outlining methodological approaches and challenges within the scope of online learning.

Teaching Assistant *Jan. 2024 – May 2024*
Iran University of Science and Technology (IUST), Tehran, Iran

- *Course Instructor:* [Dr. Sauleh Etemadi](#)
- Assisted in teaching and grading for **Algorithms and Design**, providing guidance and support to undergraduate students.
- Contributed to the course as a volunteer, demonstrating commitment to student learning and academic service.

Teaching Assistant *Jan. 2024 – May 2024*
Iran University of Science and Technology (IUST), Tehran, Iran

- *Course Instructor:* [Dr. Reza Entezari-Maleki](#)
- Assisted in teaching and grading for **Theory of Languages and Automata**, and developed solutions for nearly all problems in the course textbook by Sipser.
- Volunteered to contribute to the course, demonstrating a strong commitment to student learning and academic service.

Scientific Committee Member *2022*
Iranian Geometry Olympiad (IGO)

- Contributed to Iran's largest geometry competition as a member of the IGO Scientific Committee.
- Reviewed and verified solutions for 300 students in the final round of the contest, ensuring accuracy and clarity in problem solutions.

REFERENCES

Prof. Reza Entezari-Maleki
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Dr. Samira Hossein-Ghorban
IPM Institute For Research In Fundamental Sciences
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University of Birmingham
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