Aram Ebtekar

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Employment History

2022 – · · · · **Independent AI & Physics Researcher.** Using a broad range of theoretical tools, I tackle foundational problems that most would consider too hard or open-ended. Occasionally I take industry contracts, the main one being in autonomous driving for Caterpillar.

2025 **ML Alignment & Theory Scholars** winter program on aligning future artificial intelligences to human values.

2018 – 2019 **Mythic, Senior AI Research Scientist.** Led two exploratory efforts: video super-resolution, covering the whole pipeline from realistic dataset collection to neural architecture design; and hardware co-design investigations on how efficiently convolutional layers map to hardware, and how long the resulting models retain their accuracy.

2016 – 2018 **Waymo, Behavior Prediction Research Engineer.** Framed driver behaviour as trajectory optimization problems, enabling autonomous cars to predict surrounding drivers' movements in real-time; visualized the predictions; and led a study+brainstorm group to explore long-term solutions, particularly with deep reinforcement learning.

Education

2019 – 2022 **Self-directed** custom version of what I wished my Ph.D. could be. An eclectic mix of graduate-level math, physics, economics, information theory, and undergrad-level humanities, gathered from a combination of UBC courses, MIT OpenCourseWare, textbooks, papers, and so on. It culminated in a research manuscript detailing a rigorous model for the casual arrow of time, which later became a featured cover article in Entropy. On the applied side, I developed and published the Elo-MMR skill estimation algorithm, now used by popular competition platforms such as CodeChef and DMOJ.

2012 – 2015 **Carnegie Mellon University, Ph.D. dropout with M.S.** in Computer Science.
- Research projects in hybrid systems verification and search-based planning
- Teaching Assistant for 15-451/651 (Algorithms)
- Completed the 2012 Summer School in Algorithmic Economics
- Memberships: Graduate Student Assembly departmental representatives, Ballroom Dance Club, School of Computer Science musical performances

2008 – 2012 **University of British Columbia, B.Sc. Honours** in Computer Science & Mathematics.
- Research projects in evolutionary game theory and computational geometry
- GPA: 92% (A+)

Research Publications

1. A. Ebtekar and M. Hutter, "Foundations of algorithmic thermodynamics," *accepted for publication in Physical Review E*, 2025.
2. A. Ebtekar, Y. Wang, and D. Janzing, "Algorithmic information theory of outlier propagation," *submitted to Conference on Causal Learning and Reasoning*, 2025.
3. A. Ebtekar and M. Hutter, "Modeling the arrows of time with causal multibaker maps," *Entropy* ***cover article***, vol. 26, no. 9, p. 776, 2024.

4 A. Ebtekar and P. Liu, "Elo-MMR: A rating system for massive multiplayer competitions," in *Proceedings of 30th The Web Conference*, 2021, pp. 1772–1784.

Skills

Nat. Languages	Fluent in English, French, Persian. Beginner in Spanish, Mandarin, Japanese.
Prog. Languages	Rust, C++17, LaTeX, Python, PyTorch, Keras, Java, C.
Academic	Theoretical computer science, mathematics, statistics, physics, philosophy, economics, robotics, machine learning, software design, technical writing, teaching.

Miscellaneous Experience

Contest Achievements

- 2015 61st place among over 50,000 registrants in the Google Code Jam.
- 57th place in the Topcoder Open Algorithm Competition.
- 6th place in the North American Invitational Programming Contest's Open Division, as a solo contestant against teams of up to three.
- Achieved Codeforces Grandmaster title, peak rating 2400+ on both Codeforces and Topcoder
- ACM ICPC Pacific Northwest regional contest problem setter, author of problems J,L,N.
- 2012 18th place in the ACM ICPC World Finals in Warsaw, Poland.
- 2011 Top 250, Team Honorable Mention in the William Lowell Putnam Mathematical Competition.
- UBC Thunderbots, 9th place in the RoboCup SSL international robot soccer competition.

Selected Projects

- 2020 **Technical Blogging**. My top article made the front page of Hacker News and received over 200 comments.
- 2017 **Rust Algorithms Cookbook**. A collection of classic algorithms and data structures elegantly crafted in Rust, serving as a proof of concept of the language's compile-time safety discipline in contest programming. On 20/06/2017, it was the #1 trending GitHub repository globally.
- 2012 **U! Robot!** Lead engineer in a team of 8 developers, completing a platformer game that was showcased at the 48-hour Global Game Jam.