

## Profile

- Interested in: deep learning, optimization, planning, data structures, epistemology, educational game design
- World-class performance record in algorithmic computing competitions
- Enjoy bridging theoretical tools, exploring novel approaches, and collaborating to turn visions into reality
- Proficient in C++, Java, Rust, Python, and TensorFlow ([github.com/EbTech](https://github.com/EbTech))
- Canadian citizen fluent in English, French and Farsi; elementary knowledge of Spanish, Mandarin, Japanese

## Work Experience

- 2016 – current     • **AI Researcher/Engineer at Waymo:** designing new algorithms for optimization, geometry, and machine learning to enable detailed real-time predictions of behaviors on the road.

## Education

### *Lifelong Learning*

- 2016 – present     • Independent study of Mandarin Chinese, phonetics, finance theory, stochastic calculus, variational calculus, deep learning, deep reinforcement learning, and Rust programming

### *Carnegie Mellon University*

- 2012 – 2015       • Ph.D. candidate in Computer Science (dropped with M.S.)  
• Teaching Assistant for 15-451/651 (Algorithms) taught by Avrim Blum and Anupam Gupta  
• Completed the 2012 Summer School in Algorithmic Economics  
• NSERC Alexander Graham Bell Canada Graduate Scholarship  
• Memberships: Graduate Student Assembly departmental representative, Ballroom Dance Club, School of Computer Science musical performances

### *University of British Columbia*

- 2008 – 2012       • B.Sc. Combined Honours in Computer Science and Mathematics with Distinction  
• 92% (A+) GPA, Dean's Honour List and Science Scholar standing  
• President's Entrance Scholarship (top tier), Trek Excellence Scholarship, CPSC Scholarship  
• 8-month game development internship at Electronic Arts, working on Need For Speed: World

## Research and Personal Projects

- 2015     • **Elo-R rating system:** derived a Bayesian model and implemented a simple rating system for competitions in which the outcome is a total ordering among players, proposed as an improvement over the systems used to track players' skill in online programming competitions
- 2015     • **Cooperative multi-agent planning:** proved NP-hardness of planning with very simple constraints on visitation order, then proposed two heuristic search algorithms to handle a more general set of constraints with guarantees on the suboptimality factor of the path length; advised by Prof. Maxim Likhachev
- 2014     • **Parallel A\* framework:** developed a theoretical framework that generalizes A\* search; applications include anytime dynamic multi-heuristic or multi-processor search; advised by Prof. Maxim Likhachev

## Research and Personal Projects (continued)

- 2013 • **Dynamic Łukasiewicz Game Logic:** generalized hybrid games with binary outcomes to a formal specification of zero-sum hybrid games with extended real outcomes, and derived its sequent calculus for semi-automated theorem proving; advised by Prof. André Platzer
- 2012 • **Linking population dynamics:** proposed a new population model to represent social interactions in the context of natural selection; theoretical and experimental analyses found the emergence of a nontrivial form of cooperation in scenarios resembling the Prisoner's Dilemma
- 2012 • **U! Robot!:** lead programmer in a team of 8 developers, completing a platformer game that was showcased at the end of the 48-hour Global Game Jam
- 2011 • **Equitable clustering:** derived an approximation algorithm for quantizing distributions on Euclidean space, with applications to image stippling; advised by Profs. David Kirkpatrick and William Evans
- 2011 • **AIspace.org contributions:** developed practice exercises and sample solutions to reinforce key concepts for students in undergraduate artificial intelligence courses
- 2008 • **Cybersword Duels:** a pair of sword-dueling video game engines, one in 2D and one in 3D, that map mouse movements intuitively into fully controllable sword motions, with collision physics; the 2D game has an opponent trained to beat humans by reinforcement learning

## Contest Achievements

- 2015 • **61st place** among over 50,000 registrants in the Google Code Jam
- 2015 • **57th place** in the TopCoder Open Algorithm Competition
- 2015 • **6th place** in the North American Invitational Programming Contest's Open Division, competing solo against teams of up to three
- 2015 • Achieved Codeforces **Grandmaster** title, peak rating 2400+ on both Codeforces and TopCoder
- 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
- 2010 – 2011 • Member of the UBC Thunderbots, which placed **9th** in the **RoboCup** SSL international robot soccer competition; I developed some AI algorithms, e.g. filters for ball and robot tracking

## Sample Coursework (grad-level marked with \*)

- Math • Statistical Inference\*; Evolutionary Dynamics\*; Number Theory\*; Intro Topology; Advanced Linear Algebra; Mechanics; Algebra, Coding Theory and Cryptography
- Theory • Computational Complexity Theory\*; Type Systems for Programming Languages\*; Advanced Algorithm Design and Analysis; Graph Theory; Functional and Logic Programming
- AI • Statistical Machine Learning\*; Multimedia Databases and Data Mining\*; Kinematics, Dynamic Systems and Control\*; Intelligent Systems

## Sample Coursework (grad-level marked with \*) (continued)

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|--------|---|
| Misc   | • Advanced Distributed Operating Systems*; RPG Writing Workshop*; Computer Graphics   |
| Audits | • Adaptive Control & Reinforcement Learning*; Planning, Execution & Learning*; String Algorithms*; Information Theory*; Design Educational Games*; Experimental Game Design |

## Volunteering

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|------------|--|
| 2015       | • <b>ACM ICPC problem setter:</b> authored the problems J,L,N in the Pacific Northwest regional programming contest, and helped with additional writing/reviewing/testing; our aim is to raise the bar for programming contest quality in North America, for experts and novices alike |
| 2013, 2015 | • <b>FIRST Lego League research judge:</b> judged and gave feedback on research project presentations by teams of children aged 9-14 aimed at solving global issues using STEM principles  |
| 2006       | • <b>Science AL!VE summer camp assistant:</b> helped run activities to encourage scientific curiosity in young children  |