Alexander Fischer

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Education

University of Massachusetts, Amherst Fall 2016–Spring 2020

- **Majors**: Computer Science, Pure Mathematics. **GPA**: 4.0.
- **Relevant graduate level coursework**: Neural Networks, Reinforcement Learning, Advanced Algorithms, More Advanced Algorithms, Machine Learning, Formal Language Theory, Theory of Computation, Mathematical Cryptography Quantum Mechanics, General Relativity
- **Other relevant coursework**: Artificial Intelligence, Computer Systems Principles, Abstract Algebra I & II, Linear Algebra, Statistics, Differential Equations, Differential Geometry, Discrete Structures, Multivariable Calculus

Academic Experience

Autonomous Mobile Robotics Laboratory, University of Massachusetts Amherst January 2018–May 2019

- Performed original research on a novel algorithm for time-optimal control of omnidirectional robots and implemented that algorithm on real robots in C++.
- Published a second-author paper in the International Conference On Intelligent Robots and Systems, 2018.
- Wrote software to automatically calibrate latency values for robot motion.

Research Experience for Undergraduates, University of Miami Summer 2017

- Wrote software to analyze three dimensional images of mice optic nerves that were multiple gigabytes each, in order to assist medical researchers studying neuron regeneration.
- Implemented novel and existing computer vision algorithms in MATLAB and C++.
- My research poster is available at http://www.cs.miami.edu/reu-cfs/2017/posters/FischerPublicPoster.pdf.

Publications

- David Balaban, Alexander Fischer, Joydeep Biswas (2018). A Real-Time Solver For Time-Optimal Control Of Omnidirectional Robots with Bounded Acceleration. In *Intelligent Robots and Systems (IROS), IEEE/RSJ International Conference on.* Available: https://arxiv.org/abs/1707.04617

Work Experience

Software Engineer Intern, Microsoft Summer 2019

- Working on an internal tool used to analyze customer satisfaction data gathered from Office 365 customer surveys.
- Doing full stack development with C# on ASP.NET, SQL, Typescript, and React.

Software Engineer Intern, Microsoft Summer 2018

- Added features to the Windows photo viewer and to the Photos Companion mobile app used to import photos from phones into a PC.
- Used C# with UWP for the desktop application and C# with Xamarin for the cross-platform mobile application.
- Designed and implemented new network protocol features to improve the photo transfer experience.

Teaching Assistant, University of Massachusetts Amherst January–December 2017

- Undergraduate TA for math class 'Fundamental Concepts of Mathematics'. Fall 2017
  - Taught discussion sections, held office hours, and graded homework assignments.
- Undergraduate TA for computer science class 'Programming with Data Structures'. Spring 2017
  - Graded assignments from discussion sections.

Skills

- **Programming languages**: C++, C, C#, Java (including Android), Python.
- **Technologies**: PyTorch, Matplotlib, Git, Linux, Xamarin, LaTeX.

Personal/Class Projects

- **LSTM transfer learning**: Came up with a way to perform transfer learning with stacked LSTM neural networks and implemented my ideas on text data for a final project in a graduate-level neural networks class. Used Python and PyTorch.
- **Quadratic sieve**: Implemented quadratic sieve factoring algorithm as part of a group project in a mathematical cryptography class. Successfully factored 120 bit numbers in less than a day. Used C.
- **Chamberwell**: Android game published on the Google Play store where one tilts the screen to transport moving balls into the correct chambers. Used Java, Android Studio.
- **Mandelbrot set renderer**: Renders the Mandelbrot set with smooth coloring and multithreading. Used Java.
- **SPIRE autoenroller**: Continuously checks if a class is open on SPIRE, the course enrollment system at UMass, then automatically enrolls one in it if so. Used Java, Selenium.

Activities and Awards

- **Putnam Exam, 2017** (a national mathematics competition for undergraduate students): Scored 19 points, ranking in the top 17% of the country.
- **Jacob-Cohen-Killam Math Competition, 2017** (competition for University of Massachusetts students): won second place, including a $1000 prize.
- **Hack Harvard, 2017**: Won best IoT hack for a voice controlled robotic drink mixer built with Amazon Alexa.
- **Hack Holyoke, 2016**: Won best hardware hack for a bike lock that could be controlled from a phone via bluetooth.