Ryien Hosseini

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RESEARCH INTERESTS

I am a PhD student in the Department of Computer Science at the University of Chicago, where I am advised by Hank Hoffmann and Rebecca Willett. I am broadly interested in developing **adaptive machine learning** algorithms, or algorithms that dynamically adjust their behavior in response to changes in input data distribution or attributes, performance constraints, task requirements, and other evolving factors.

EDUCATION

University of Chicago — *September 2023 - Present*
Doctor of Philosophy (**Ph.D.**) in Computer Science ***(In Progress)***
Advisors: Hank Hoffmann and Rebecca Willett
Cumulative GPA: 4.00/4.00

University of Michigan, Ann Arbor — *September 2021 - December 2022*
Master of Science (**M.S.**) in Electrical and Computer Engineering
Concentration: *Signal & Image Processing and Machine Learning*
Cumulative GPA: 3.98/4.00

University of Michigan, Ann Arbor — *September 2017 - August 2021*
Dual Bachelor's Degrees:

- Bachelor of Science in Engineering (**B.S.E**) in Computer Engineering

- Bachelor of Science (**B.S.**) in Cognitive Science, Concentration: *Computation & Cognition*

Minors: *Mathematics*, *Near East Studies*
Combined Cumulative GPA: 3.52/4.00
Combined Last 60 Credits GPA: 3.95/4.00

RESEARCH EXPERIENCE

Predoctoral Researcher — *January 2023 - September 2023*
Argonne National Laboratory
Supervisors: Venkatram Vishwanath, Filippo Simini
I was primarily responsible for developing graph machine learning architectures for applications such as chemical docking, social networks, molecule dynamics, and financial fraud detection. Additionally, I helped develop a framework for extending primitive operations for existing graph neural network (GNN) models on HPC platforms. This work contributed the research group's overarching goals of rigorously exploring the development and application of GNN models for scientific computing.

Graduate Research Intern — *May 2021 - December 2022*
Supervisors: Arvind Ramanathan, Venkatram Vishwanath
I was primarily responsible for the development of GNN-based machine learning pipelines for protein dynamics simulation and chemical docking applications. I was also responsible for benchmarking and optimizing existing GNN architectures on HPC platforms, as well as some minor miscellaneous work in areas such as GAN-based chemical discovery.

Research Assistant   *September 2018 – January 2020*
University of Michigan, Ann Arbor
Miniature Tether Electrodynamic Experiment (MiTEE)
Supervisor: Brian Gilchrist
Joint faculty-student research team. I helped develop a metallic file system for use on ultra-low power satellite that uses only electrodynamics for motion. This file system interacts with four asynchronous TI MSP-430 microprocessors. Satellite was launched into low Earth orbit in February 2021.

PUBLICATIONS   <u>**Peer Reviewed Conference and Workshop Proceedings**</u>

6. **A Deep Probabilistic Framework for Continuous Time Dynamic Graph Generation**
Ryien Hosseini, Filippo Simini, Venkatram Vishwanath, Henry Hoffmann
The Thirty-Ninth AAAI Conference on Artificial Intelligence (AAAI), 2025

5. **Exploring the Use of Dataflow Architectures for Graph Neural Network Workloads**
Ryien Hosseini, Filippo Simini, Venkatram Vishwanath, Ramakrishnan Sivakumar, Sanjif Shanmugavelu, Zhengyu Chen, Lev Zlotnik, Mingran Wang, Philip Colangelo, Andrew Deng, Philip Lassen, Hongqian Rong, Shukur Pathan
The Thirty-Eighth International Conference on High Performance Computing (ISC), Workshop on HPC on Heterogeneous Hardware, 2023

4. **Piloting a Flexible Deadline Policy for a First-Year Computer Programming Course**
Isha Bhatt, Laura K Alford, Lesa Begley, **Ryien Hosseini**, Deborah A Lichti
American Society for Engineering Education Annual Conference (ASEE), 2023

3. **Deep Surrogate Docking: Accelerating Automated Drug Discovery with Graph Neural Networks**
Ryien Hosseini, Filippo Simini, Austin Clyde, Arvind Ramanathan
The Thirty-Sixth Conference on Neural Information Processing Systems (Neurips), Workshop on AI for Science, 2022

2. **Turns Out Our Exams Were Pointless, So We Changed Our Assessment Strategy**
Laura K. Alford, Heather Rypkema, Harsh Jhaveri, **Ryien Hosseini**, Megan Beemer
American Society of Engineering Education Annual Conference (ASEE), 2022

1. **Operation-Level Performance Benchmarking of Graph Neural Networks for Scientific Applications**
Ryien Hosseini, Filippo Simini, Venkatram Vishwanath
Fifth Conference on Machine Learning and Systems (MLSys), Workshop on Benchmarking Machine Learning - Workloads on Emerging Hardware, 2022

INDUSTRY   **Apple, Inc.**   *June 2020 – August 2020*
EXPERIENCE   Software Engineering Intern
Cupertino, CA (Remote due to COVID-19)
I was primarily responsible for developing software infrastructure to support development and testing/validation of hardware IP blocks. Additionally, I implemented a library for analysis of hardware IP test coverage, performance, and other metrics. This library is used for analysis of hardware blocks deployed in various company audio products.

Texas Instruments *May 2019 – August 2019*
Hardware Design Intern
Dallas, TX
I was responsible for developing register transfer level (RTL) logic for the development of a battery monitoring microprocessor for mobile devices. Additionally, I aided in the development of firmware that runs on a metallic filesystem and supports interaction of IP block within a larger system on chip. This led to a 15% runtime performance increase compared to previous firmware iteration.

Benzinga *May 2018 – August 2018*
Software Engineering Intern
Detroit, MI
I was responsible for the development of a time-series model that analyzes the effect of analyst ratings and news releases on the performance of financial equities. I designed and implemented an LSTM-based model to achieve this. This model currently serves as a backend to a recommender system on the company's stock trading platform.

TEACHING EXPERIENCE

Graduate Student Instructor *August 2021 – December 2022*
University of Michigan, Ann Arbor
I work as graduate student instructor for ENGR 101: Introduction to Computation and Programming. This is the first course in the university's core sequence for computer science students. My responsibilities include teaching multiple weekly lab sessions, working with faculty to develop course curriculum, aiding students during office hours, and grading exams/assignments.

Instructional Aide *August 2020 – May 2021*
University of Michigan, Ann Arbor
I worked as an instructional aide for EECS 280: Programming and Introductory Data Structures. This is the second course in the university's core sequence for computer science students. My responsibilities included teaching weekly lab sessions, working with faculty to develop course curriculum, aiding students during office hours, and grading exams/assignments.

SKILLS

Programming: Python, C/C++, Julia, Lisp (Scheme)
Software: PyTorch (inc. PyTorch Geometric, DGL), TensorFlow/Keras, scikit-learn, OpenCV
Spoken Languages: English (native), Persian (native), Spanish (professional)

VOLUNTEERING

Google CS First *January 2018 – January 2020*
Co-founder and vice-President
I collaborated with Google for Education to design curriculum that teaches computer science concepts at a primary school level. I lead lectures and mini-lab modules to fourth and fifth students in order to teach fundamental concepts in an accessible way. I also advise students on pursuing STEM education in secondary school and beyond.