Daniel Melcer

daniel@melcer.dev | (631) 682-0560 | github.com/dmelcer9 | linkedin.com/in/dmelcer9/

Education

Northeastern University

Boston, MA

Khoury College of Computer Sciences

PhD Student in Formal Methods and Reinforcement Learning | GPA: 4.0

Advised by Christopher Amato and Stavros Tripakis

September 2021 - Present (Expected Completion: August 2026)

Bachelors of Science in Computer Science, Minor in Math | GPA: 4.0

September 2017 - May 2021

Publications

Approximately Aligned Decoding

Daniel Melcer, Sujan Gonugondla, Pramuditha Perera, Haifeng Qian, Wen-Hao Chiang, Yanjun Wang, Nihal Jain, Pranav Garg, Xiaofei Ma, Anoop Deoras

NeurIPS 2025

Learned Shields for Multi-Agent Reinforcement Learning

Daniel Melcer, Christopher Amato, Stavros Tripakis

ALA @ AAMAS 2025

Incremental Quotient Language Recognition to Improve LLM Code Generation Quality

Daniel Melcer, Nathan Fulton, Sanjay Krishna Gouda, Haifeng Qian

arXiv:2402.17988

Shield Decentralization for Safe Reinforcement Learning in General Partially Observable Multi-Agent Environments

Daniel Melcer, Christopher Amato, Stavros Tripakis

RLC 2024

AAMAS 2024 (Extended Abstract)

Shield Decentralization for Safe Multi-Agent Reinforcement Learning

Daniel Melcer, Christopher Amato, Stavros Tripakis

NeurIPS 2022

Safe RL @ IJCAI 2022

RLDM (Extended Abstract)

Multi-Agent Tree Search with Dynamic Reward Shaping

Alvaro Velasquez, Brett Bissey, Lior Barak, Andre Beckus, Ismail Alkhouri, Daniel Melcer, George Atia

ICAPS 2022

ProofViz: An Interactive Visual Proof Explorer

Daniel Melcer, Stephen Chang

Trends in Functional Programming 2021

Dynamic Automaton-Guided Reward Shaping for Monte Carlo Tree Search

Alvaro Velasquez, Brett Bissey, Lior Barak, Andre Beckus, Ismail Alkhouri, Daniel Melcer, George Atia

AAAI 2021

Verification-Guided Tree Search

Alvaro Velasquez, Daniel Melcer

AAMAS 2020 (Extended Abstract)

Experience

Amazon Web Services

Applied Research Intern
New York, NY
May 2025 - August 2025

- Analyzed recent prompt optimization techniques, designed and executed experiments to show that observed behavior of certain methods are inconsistent with popular explanations of their mechanisms.

May 2024 - August 2024

- Developed sampling method to balance generation latency and quality for difficult to satisfy LLM output constraints, resulting in a significant increase in automated and human-evaluated metrics.

May 2023 - August 2023

- Researched incremental parsing and quotient language generation for context-sensitive programming languages, including those with complex lexing rules and whitespace sensitivity.
- Implemented constrained generation of LLMs for a Python 3 fill-in-middle task, leading to a significant increase in generations which are accepted by a Python parser.

Griffiss Institute

Research Intern for Air Force Research Laboratory
Rome, NY
June 2021 - August 2021

- Extended work on automatically learning a high-level human-interpretable automaton representation of a complex reinforcement learning environment
- Created a method which transfers knowledge between two agents through an automaton representation of a task, using a modified version of the traditional Q-learning loss function

January 2019 - June 2019

- Used Pytorch to implement a formal specification based reinforcement learning mechanism to enable a 50% higher success rate in sparse-reward tasks, with the ability to transfer knowledge to similar tasks
- Researched an exploration method that combines intrinsic curiosity networks and tree search to explore new environments without manually specifying a reward function

Datto

Software Development Intern
Norwalk, CT
January 2020 - May 2020

- Migrated thousands of lines of Javascript to Typescript and formalized shared object types
- Wrote two new chapters for the internal style guide on Typescript type design and SQL best practices
- Designed and prototyped a mock server to simulate external dependencies during automated tests

Forward Thinking Systems

Software Development Intern
Jericho, NY
May 2018 - August 2018

- Analyzed sensor data with Python and Keras to detect potential camera blockages and failures in thousands of commercial vehicle dashcams
- Developed an extensible Typescript Alexa skill for users to perform common administrative tasks

Brookhaven National Laboratory

Summer Research Intern
Upton, NY
July 2017 - August 2017

- Wrote a Python desktop application to sort and search a database of over 1,000 ethernet ports
- Constructed a Django website to improve the efficiency of administering on-site network switches

July 2016 - August 2016

- Increased speed of search for mathematical constants by over 100x by parallelizing search with CUDA

Teaching

Logic and Computation

September 2023 - December 2023
September 2022 - December 2022

Fundamentals of Computer Science 1—Accelerated

September 2019 - December 2019
September 2018 - December 2018

Fundamentals of Computer Science 1

September 2020 - December 2020
January 2018 - April 2018