

# Aaron Trowbridge

(610) 955-1580 · aaron.j.trowbridge@gmail.com · aarontrowbridge.github.io

## Education

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### Syracuse University

- B.S. in Physics, with distinction (3.6 GPA); B.S. in Mathematics (3.8 GPA) Sep 2015 – Dec 2020

## Experience

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### Research Associate (Carnegie Mellon Robotics Exploration Lab)

Aug 2022 – Present

- Researching quantum optimal control under Prof. Zac Manchester and Prof. David Schuster.
- Developed and tested a novel pulse generation method on hardware systems.
- Developed the following open source software packages:  
QuantumCollocation.jl, IterativeLearningControl.jl, and NamedTrajectories.jl.

### Data Engineering Intern (CatalystIQ)

May 2022 – Aug 2022

- Developed backend components for an automated content tagging platform used in marketing analytics tasks.
- Implemented data ingestion pipelines for large continuously updating healthcare datasets utilizing AWS services combined with Snowflake databases.

### Teaching Assistant (Syracuse University Physics Department)

- One semester as graduate TA: PHY 211 taught by Prof. Walter Freeman Jan 2021 – May 2021
- Four semesters as undergrad TA: astronomy, mechanics, E & M, computational physics Jan 2019 – Dec 2020

## Talks & Publications

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### Quantum Collocation and Iterative Learning Control

*Talk, SIAM CSE23, March 2023*

- Speaker: **Aaron Trowbridge**

### Piccolo.jl: An integrated quantum optimal control stack

*Talk, JuliaCon 2023, YouTube, July 2023*

- Speaker: **Aaron Trowbridge** and Aditya Bhardwaj

### Direct Collocation for Quantum Optimal Control

*Paper and Talk, IEEE QCE23 (2nd best paper award), ArXiv, Sept. 2023*

- Authors: **Aaron Trowbridge**, Aditya Bhardwaj, Kevin He, David I. Schuster, and Zachary Manchester

## Projects

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### Superconducting Quantum Devices

- Extracted device parameters from spectroscopic data using Python and built simulations of Josephson Junction circuit dynamics in Julia advised by Prof. Britton Plourde.
- Simulation code can be found [here](#).

### Quantum Computation

- Implemented a custom quantum gate programming language and virtual quantum processor, in Julia.
- Code can be found [here](#).

### Monte Carlo Methods for Lattice Quantum Gravity

- Developed a novel rejection-free variant of the Metropolis algorithm specially designed for dynamical triangulation simulations of quantum gravity, advised by Prof. Jack Laiho and Prof. Walter Freeman.
- A recorded talk I gave can be found on [youtube](#), a short blog post can be found [here](#), and a GitHub repo [here](#).

### Deep Generative Models

- Implemented generative adversarial networks (GANs) for image generation from scratch in Julia using Flux.jl.
- Conducted additional research on conditional GANs and various types of variational autoencoders (VAEs).
- Code can be found [here](#) and a blog post [here](#).

## Additional Information

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**Programming:** Julia, Python, SQL, AWS, Git, L<sup>A</sup>T<sub>E</sub>X

**Hobbies:** Reading, Chess, Snowboarding, Surfing, Skateboarding, Horseback Riding, Hiking