# Taiki Aiba

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## Education

**Georgia Institute of Technology** May 2027

*B.S. & M.S. in Computer Science, B.S. & M.S. in Mathematics, B.S. in Applied Languages, Minor in Economics* *GPA: 3.96/4.0*

- **Coursework**: OS, Computer Architecture, Processors, Systems/Networks, PLT, Machine/Deep Learning, Statistics
- **Teaching Assistant**: Algorithms (4x), Discrete Mathematics (3x), Multivariable Calculus (1x), Intro to CS I (1x)

## Experience

**Williams College** June 2025 – August 2025

*Graduate Research Mentor (NSF REU)* *Williamstown, MA*

- Mentored 20 undergraduates on a research problem of the real-time card game *Quads* through weekly reading sessions.
- Wrote 2 C++ scripts to find the maximum number of quads, one recursive and one using the Moser-de Bruijn sequence.
- Optimized recursion in Rust, reducing runtime by over 400% via multithreading, specifying targets, and early exiting.
- Proved bounds on the maximum number of quads in a deck of size a power of 2, presented at the 2025 and 2026 JMM.

**Amazon** June 2024 – August 2024

*Software Development Engineer Intern* *Boston, MA*

- Created a discrete event simulation model in SimPy for 100+ engineers to visualize packet flows in one of Alexa's nodes.
- Developed a C++ script that interacts with Alexa's internals, feeding packets of variable sizes and recording latencies.
- Parsed 100k+ lines of CSV strings/JSON arrays with Python to extract mean and individual packet latency/size data.
- Formed an 85%-accurate quadratic of fit, training with small sizes and comparing latency to size graphs with Matplotlib.

**Georgia Tech School of Electrical and Computer Engineering** August 2023 – December 2023

*Research Assistant* *Atlanta, GA*

- Translated docs of the Japanese NEC PC-FX game console to English, storing 12 files of 15k+ lines in Github Pages.
- Researched the PC-FX's address map, register list, and I/O access space and the specs of its sound processing device.
- Analyzed the C Compiler of the GMAKER Starter Kit (processing flow/registers), allowing user-made software to run.
- Wrote graphical software in C with the kit to run on the PC-FX to showcase its usability to a team of 3 and a professor.

## Projects

**De Mathematics Competitions** (Founder and Director) | *Jekyll, JavaScript, CSS, Python*

- Designed a GitHub Pages platform using Jekyll, JavaScript, and CSS that hosts math contests, solutions, and videos.
- Crafted 300+ problems for 10+ live contests taken by 500+ students worldwide, earning an average quality of 4.8/5.
- Wrote a Python automation script to generate contests with 80 problems, reducing creation time by 98% (hrs to mins).
- Maintained version control, releases, and documentation through a GitHub repository that spanned over 5+ years.

**Ceff: A Small C-like Language with Effects** | *Python, C*

- Co-invented a language based on C with a built-in effect system to combine paradigms (error handling, iterators, etc.).
- Developed a compiler with Python that makes a Ceff program C-compliant through an AST transformation pipeline.
- Reduced latency on 5000 socket connections from 3352 ms on a synchronous C server to 55 ms on a Ceff server.

**Profit Maximization in Weighted Graph** (4th Place Team at Low Latency Challenge) | *C++, Python*

- Designed a randomized algorithm in C++ deciding whether to add edges based on profit, enhanced with a learning rate.
- Utilized multithreading with a Python script to extract results faster, achieving 16x the number of answers to submit.
- Created an MST graph before running the randomized algorithm using union-find to establish a working starting profit.

**Graph Neural Networks for Recommender Systems** | *PyTorch Geometric, pandas, Matplotlib*

- Developed 3 variations of graph neural networks with PyTorch Geometric, extracting from a dataset from MovieLens.
- Leveraged edge features, using BERT to embed users/movies and computing similarity scores with cosine similarity.
- Achieved an RMSE of 1.0179, nearing the state-of-the-art models UBCF (0.978) and IGMC (0.905) (integer ratings 1-5).

**Court Scheduling App** (4th Place at GT CS Junior Design Expo) | *TypeScript, Firebase, Expo, Node.js*

- Led backend work in a team of 5 for a court reservation app deployed with Expo (React Native) for 1000+ residents.
- Integrated waitlist class/fields in Firestore with FCFS scheduling/cancellation logic in TypeScript for seamless testing.
- Utilized EmailJS to send reservation emails and Firebase Auth. for verification, offering a robust notification system.

## Skills

**Languages**: C/C++, Python 3, Java, Go, Rust, JavaScript/TypeScript, SQL, R, Verilog/SystemVerilog
**Machine Learning**: NumPy, pandas, PyTorch, TensorFlow, scikit-learn, SimPy, Matplotlib
**Technologies**: React, Expo, Node.js, Spring Boot, Firebase, Docker, GCP, MongoDB, Git, Bash, Linux, WSL, Jira
**Certifications**: Akuna Capital – Options 201, MIT Professional Learning – No Code AI and Machine Learning
**Awards**: USACO Silver, Codeforces Specialist (top 8%), 24 on Putnam (606th/4000+), 10 on AIME twice (top 4%)