

# Brook Mao

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## Education

University of Toronto, Bachelor of Science in Computer Science

Sep 2023 to Aug 2027

- CGPA: 3.97/4.0
- **Relevant Coursework:** Software Design, Numerical Algorithms, Computer Organization

## Technologies

**Programming Languages:** Python, Java, SQL, JavaScript, TypeScript, C, C++, PHP

**Libraries & Frameworks:** React, Node, Express, jQuery, Flask, Bootstrap, Tailwind, Jest, JUnit, unittest

**Computer Science Fundamentals:** Object-Oriented Programming, Data Structures, Algorithms

**Databases:** MySQL, MongoDB, Firebase Realtime Database

**Tools, Platforms & DevOps:** Git, Docker, GitHub Actions, AWS, GCP, Azure, Linux, NGINX, Firebase, CI/CD

**Machine Learning & Data Analysis:** TensorFlow, Pandas, NumPy, Matplotlib, SciPy

**Soft Skills & Methodologies:** Agile, Scrum, Communication, Teamwork, Problem-Solving, SDLC

## Projects

### ThreatTrace AI

[Link to Project](#)

- Collaborated in a team of 4 at Hack the Valley to develop a machine learning model using Python that classifies cell images as healthy or malaria parasitized with 95.45% accuracy, winning the Pulsar ML Challenge.
- Coordinated tasks and clarified roles for teammates to deliver a working prototype within 36 hours.
- Built the neural network using TensorFlow and trained it on a dataset of over 27,000 images, documenting the process in a Jupyter notebook.
- Conducted data preprocessing on the training data and user-uploaded images to ensure model compatibility.
- Deployed the model via a web app using HTML, CSS, Bootstrap, and JavaScript to create a sleek UI, and Flask to develop a REST API backend, allowing users to try the model out with their own images.
- Set up a CI/CD pipeline with GitHub Actions, automating Docker image builds and deployments to GCP.

### Toronto Asian Art Museum Mobile App

[Link to Project](#)

- Developed an Android app using Java and Firebase Realtime Database for efficient artifact management.
- Led a team of 6 as Scrum Master, facilitating meetings and sprint planning, and achieving a 10/10 peer evaluation score.
- Resolved bugs for 3 team members, ensuring on-time delivery of requirements within a 1-month deadline.
- Implemented an interactive UI by extending AndroidX fragments to create custom elements.
- Applied object-oriented design patterns like Singleton and Adapter to write maintainable code.

### MultiClock

[Link to Project](#)

- Developed a multiplayer chess clock web app using React, Node.js, Express, and MongoDB.
- Designed a responsive UI to ensure the app works seamlessly on both desktop and mobile devices.
- Deployed the app on AWS using a Linux VM, configuring NGINX as a reverse proxy with HTTPS encryption, making the app accessible for anyone to use securely.
- Set up a CI/CD pipeline with GitHub Actions, automating Docker image builds and deployments to AWS.

### Portfoliify

[Link to Project](#)

- Developed a web app for creating and managing online profiles using PHP, MySQL, and JavaScript.
- Designed a data model using relational databases, featuring 5 SQL tables to efficiently store user data.
- Set up a CI/CD pipeline with GitHub Actions, automating Docker image builds and deployments to Azure.

## Python Data Analysis Projects

[Link to Project](#) 

- Analyzed large datasets containing up to 70,000 data points using Python libraries like Pandas and Matplotlib.
- Crafted clear and easy-to-understand reports visualizing data from 3 datasets, providing insights into FreeCodeCamp traffic, causes of cardiovascular disease, and global demographics.
- Normalized and cleaned datasets by removing outliers to improve the accuracy of results.
- Predicted future sea levels through statistical analysis of historical data with SciPy.

## 3D Rendering Engine

[Link to Project](#) 

- Built an object-oriented graphics program in C++ to render 3D shapes like cubes and pyramids.
- Added zoom, pan, and rotation functionalities using linear algebra and other mathematical techniques.
- Applied software design principles to ensure maintainability and future flexibility.
- Used Makefiles to streamline the build process and conducted static code analysis with Cppcheck.

## Bridge Inspector Assignment Algorithm

- Analyzed a Government of Ontario dataset containing over 2,000 bridges using Python, focusing on metrics like Bridge Condition Index to develop an algorithm that assigns inspectors to the nearest, highest-risk bridges.
- Wrote comprehensive automated tests, identifying and fixing bugs to achieve 100% program functionality.

## The Wildfire Network

[Link to Project](#) 

- Collaborated remotely in a group of 3 on GitHub to develop a site featuring wildfire news, hotspots, and a risk prediction algorithm within 36 hours at Ignition Hacks.
- Learned the Python Feedparser library on the fly to successfully extract and display real-time wildfire news from CBC RSS feeds on the homepage.

## Java Brokers

[Link to Project](#) 

- Collaborated in a team of 3 to develop a stock trading simulator using Java, featuring user authentication and easy portfolio management.
- Integrated real-time financial data using the Yahoo Finance API for the top 50 NASDAQ stocks.
- Designed the software using UML diagrams and applied object-oriented principles to promote maintainability.

## The Wacky Store

- Developed a virtual store with a social network and product recommendation algorithm using C and data structures like linked lists, trees, and graphs.
- Wrote comprehensive tests to verify program correctness and memory safety, achieving a 100% grade.

## Matrix Multiplication Calculator

[Link to Project](#) 

- Implemented a matrix multiplication algorithm in C as a command-line app to perform fast computations.
- Conducted static code analysis with Cppcheck to catch and fix buffer overflow bugs.

## Experience

### Open Source Contributor, Visual Studio Code – Remote

Mar 2024 to Apr 2024

- Shared ideas on GitHub Discussions and incorporated code review feedback from Microsoft engineers to successfully merge a pull request and resolve a backlog issue.
- Clarified settings descriptions and updated the TypeScript codebase to improve the user experience.

### Camp Counselor, Meadowvale East Apostolic Church – Toronto, Canada

Jun 2023 to Aug 2023

- Collaborated seamlessly with colleagues and contributed ideas in meetings to enhance the camper experience.
- Communicated effectively with parents to address questions and concerns, promptly resolving issues.
- Successfully organized and led summer camp activities, including engaging field trips.

### President, Agincourt Chess Club – Toronto, Canada

Sep 2022 to Sep 2023

- Effectively communicated with newcomers, leading to a 42% membership increase from 33 to 48.
- Organized club documents, including permits and membership data, using Microsoft Office and Excel.