Alexander Kozik

215-264-2104 | alex.kozik@yahoo.com | alexkozik.com | linkedin.com/in/alex-kozik/ | github.com/LambdaAK | Ithaca, NY

Education

Cornell University Ithaca NY

B.A. Computer Science, Mathematics *Aug 2022 – May 2026*

- **Relevant Coursework:** Analysis of Algorithms, OOP and Data Structures (Honors), Machine Learning, Systems Organization, Systems Programming, Functional Programming, Programming Languages and Logics, Discrete Structures, Probability Theory, Advanced Linear Algebra, Multivariable Calculus, Real Analysis, Macroeconomics
- **GPA 4.024/4.0** Dean's List, Pursuing CS Honors (ML, PL, & SWE Specialization)

Experience

REU Software/PL Engineer Intern May 2024 - Present

Carnegie Mellon University - Software and Societal Systems Department *Pittsburgh, PA*

- Used **Java** to implement a polymorphic module system in SASyLF, a proof assistant, drastically improving code reusability.
- Utilized **JavaCC**, a parser generator, to implement a recursive descent parser for an extension to SASyLF's syntax.
- Engineered a highly efficient **deep cloning algorithm** for a class hierarchy with 100+ classes, utilizing a **caching mechanism** to prevent redundant cloning and infinite loops, ensuring reliable duplication of abstract syntax trees.
- Developed a **substitution algorithm** designed to switch out parts of an abstract syntax tree with other nodes.
- Created a modular testing framework using **Python** to automate unit tests and integration tests, ensuring code reliability.

Full Stack Software Engineer Aug 2023 – Present

Cornell University CMSX *Ithaca, NY*

- Maintain Cornell's official CS course management system, used by 8,000+ students, ensuring efficiency and reliability.
- Designed **serializable data structures** in **Java** and **TypeScript** for storing student data, improving code modularity.
- Built 10+ APIs in **Java** and **TypeScript** that use **HTTP** to securely transmit data between the **backend** and **frontend**.
- Developed UI components that asynchronously fetch their own data, enhancing modularity and improving API efficiency.
- Implemented a parser for CSVs in **Java** and UI in **JSP**, enabling professors to grant assignment extensions via file upload.

TA - Analysis of Algorithms & Data Structures and Functional Programming Aug 2023 – Present

Cornell Computing and Information Science *Ithaca, NY*

- Recipient of the **CS Course Staff Award** for providing exceptional service to students (awarded to less than 10% of TAs).
- Lead presentation-style recitations, giving clear and engaging explanations of course concepts and their applications.
- Hold office hours to help students grasp proofs about **greedy**, **DP**, **DC**, **graph**, **network flow** and other algorithms.
- Assist in debugging code using **Python**, **Java**, **C++**, and **OCaml**, and evaluating projects, problem sets, and exams.
- Mentored 5 groups of 3-5 students as they completed final projects, providing technical insights and problem-solving advice.

Projects

LambdaScript - Interpreter for a Custom Functional Programming Language | *OCaml, TypeScript, Jest, OUnit*

- Engineered a recursive algorithm for traversing and executing programs, achieving a 50% performance boost over Python.
- Leveraged **TypeScript types** and **ADTs** to design abstract syntax trees that model programs with low runtime overhead.
- Implemented an algorithm that computes the type of any valid expression in linear time, ensuring efficient type inference.
- Built a recursive descent parser supporting advanced types, expressions, and patterns that provides helpful error messages.

AlgoSandbox - Algorithm Visualizer | *React, TypeScript, SASS, Vite*

- Efficiently implemented 10+ algorithms and data structures in **Python**, **Java**, and **C++**, then used **React** and **CSS** to create animated sandboxes for them, demonstrating how they unfold in real time while keeping track of runtime statistics.
- Utilized **CSS** to create a collapsible search modal that helps the user navigate the algorithms by tag and autocomplete.
- Used media queries and flexbox to craft a responsive UI, ensuring optimal performance and compatibility with all devices.

HabitStack - Habit Tracking Application | *React, TypeScript, JavaScript. SASS, Express.js, Firebase, Vite*

- Implemented a secure login system with **OAuth2** authentication, allowing users to stay logged in across sessions.
- Used **React** to implement a monthly calendar that displays a user's goals and tasks, simplifying progress management.
- Developed **TypeScript** APIs to integrate with a database, facilitating seamless **frontend** and **backend** communication.
- Engineered a **backend server** that interacts with a realtime database, allowing users to save plans for achieving goals.
- Leveraged the APIs and a database to develop live chat functionality, enabling low-latency communication between users.

CritterWorld - Evolving Artificial Life Simulator | *Java, JavaFX, SceneBuilder, Gradle, JUnit*

- Used **JavaFX** and **multithreading** to design a GUI that visualizes the interactions and evolution of organisms over time.
- Implemented an abstract syntax tree parser and interpreter for a programming language that models virtual organisms, encoding behavioral instructions and random genetic mutations; implemented A* and Dijkstra's shortest path algorithms.

Technical Skills

Languages: Python, Java, JavaScript, TypeScript, C/C++, Rust, OCaml, Haskell, HTML/CSS, RISC-V Assembly
Frontend: React, JSP, Electron.js, Next.js, Redux, TailwindCSS, SASS, JavaFX, Framer Motion
Backend: Express.js, Flask, Firebase, SQL
Other: Git, AWS, Docker, Kubernetes, REST API, Linux, Pandas, PyTorch, SymPy, NumPy