Alexander Paolini

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Education

University of Central Florida, Burnett Honors College Aug. 2024 — May 2028
B.S. in Computer Science | Minor in Mathematics; Computer Engineering | 3.91 GPA *Orlando, FL*

- Computer Science Accelerated BS to MS (expected 2029)
- Associations: Knight Hacks, Honors Congress, KnightRiders, UCF Weightlifting, Programming Team
- Relevant Coursework: Intro to C, Discrete Structures, Object Oriented Programming, Computer Science 2

Experience

Software Engineering Intern May 2024 — Aug. 2024
Better World Analytics *Melbourne, FL*

- Developed **data processing scripts** using **Python** and **pandas** to analyze **call detail records** and **timing advance** tables.
- Utilized **Kepler.gl** to analyze and visualize potential criminal paths, providing insights to aid defense lawyers in preventing wrongful convictions.
- Collaborated with a team through weekly standup meetings, maintaining effective communication via email with coworkers and supervisors.

Volunteer Developer 2021 — 2023
JPBBots *Remote*

- Developed many different Discord bot applications including **Censor Bot**, a bot that automatically deletes inappropriate or disallowed words/phrases.
- Led the development of Censor Bot's filter, ensuring comprehensive coverage against inappropriate language, including handling lookalike characters and diacritics.
- Utilized **Git** and **Docker** with **TypeScript**, contributing to a project utilized by over **100,000 communities** and **millions of users**.

Projects

M - Programming Language | *Java*, *Recursive Descent Parsing*, *Abstract Syntax Tree*, *Interpreter*, *git*

- Developed a math-oriented interpreted programming language in **Java** – most notably supporting arbitrary precision numbers, functions, and lists.
- Implemented a **recursive descent parser** with a custom grammar to generate an **abstract syntax tree (AST)**, enabling correct **operator precedence**.
- Built a **tree-walk interpreter** for dynamic execution of code, supporting **arbitrary precision arithmetic**, **functions**, **control blocks**, and **lists**.
- Led a team of 4, leveraging **Git/GitHub** for **version control**, **code reviews**, and **collaboration**.

ibssbi - Bytecode Interpreter | *C*, *Binary*, *Bitwise Operations*, *Register-Based VM*

- Designed and implemented a custom register-based bytecode interpreter in **C** as a foundation for a future compiler.
- Supports execution of **37 OpCodes**, including arithmetic operations, control flow, stack management, and system calls, with room for **64 total instructions**.
- Implements a **64-register** architecture with a dedicated stack and jump/call instructions for execution flow, using a compact 32-bit instruction format.
- Optimized **instruction decoding** with **bitwise operations** and **C Macros** for performance and readability.

FiduciaryHub - Full-Stack Web Application | *Next.js*, *React*, *TypeScript*, *tRPC*

- Developed a **full-stack web application** to help fiduciaries manage wards, track billable hours and expenses, and organize documents – consolidating multiple administrative tasks into a single platform.
- Added **one-click PDF report generation** for billable hours and expense summaries, streamlining court reporting and reducing administrative overhead.

DAVe Card - Full-Stack Web Application | *Next.js*, *React*, *Typescript*, *Tailwind*, *tRPC*, *OAuth2*, *CardDAV*

- Built a lightweight contact server and social contacts manager enabling a single canonical contact card to be edited in-app and synced to friends' devices via the internet contacts standard.
- Implemented a minimal CardDAV server – following **RFC 6352** and supporting user authentication contact syncing on **all modern contact applications**, including Apple Contacts.
- Supported login via **OAuth2** with Discord, Google, and Github and a custom automatically syncing **friend-request system**

Honors and Awards

- **1st place** at Lockheed Martin Code Quest 2024
- **12th place** at the 38th Annual UCF High School Programming Tournament
- UCF Provost Scholarship

Skills

- **Programming Languages**: Python, C++, C, Java, JavaScript, TypeScript
- **Libraries/Frameworks**: numpy, pandas, Express.js, Next.JS, React
- **Tools/Platforms**: Windows, Linux, MacOs, Git, GitHub, Raspberry Pi, Node.js, VSCode, kepler.gl, LaTeX, Typst