HEZEKIAH GABALDON

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EDUCATION

Duke University, Durham *August 2022 - May 2024*
M.S. in Electrical & Computer Engineering - Quantum Computing Track
Merit Based – Full Tuition Scholarship
Overall GPA: 3.81

University of Texas, Dallas *August 2019 - May 2021*
B.S. Computer Science
Overall GPA: 3.985 (Summa Cum Laude)

Relevant Coursework: Quantum Mechanics, Intro to Quantum Engineering, Microwave Circuits, Quantum Computing, Quantum Information Theory, Quantum Error Correction, Compiler Design

RESEARCH/WORK EXPERIENCE

Duke Quantum Center December 2023 - August 2024
Software Engineer *Durham, NC*

- Developed a **Python** library to integrate state-of-the-art ion trap data from **Sandia National Labs** and generate voltage control solutions via polynomial basis regression satisfying the **Laplace equation**.
- Reduced solution generation time from **days to minutes** by optimizing python inputs to **Numpy** and incorporating **Numba** to **just-in-time compile** the **regression** loops.
- Re-implemented the regression in 3 languages to perform a **comparative study** of the runtimes, precision, and type-safety of **Python vs Julia vs OCaml** in order to aid **system design** choices.
- Co-presented a poster titled **"Control Infrastructure for Near-Term Long-Chain QCCD"** at **IEEE QCE 2023**, demonstrating how the software integrates into a **finite-state machine** for scalable and rapid voltage control in quantum hardware.

Children's Health Hospital Fall 2021
Software Engineer *Dallas, TX*

- Collaborated on the design and implementation of "Gamify Parks", a **Unity and C#** mobile app developed with Children's Health Hospital to promote physical activity and healthy habits among children.
- Deployed the application on **iOS** and **Android** platforms, integrating **augmented reality (AR)** and **GPS features**.
- Developed 2 games: **Food Finder**, an AR experience teaching nutrition, and **Beacon Dash**, a GPS-based game encouraging outdoor exercise.

PROJECTS

CirQ-Nim Summer 2022

- Integrated the calling structure of CirQ into Nim to investigate adding **compile-time checks** and **type assertions** into **quantum circuits**.
- CirQ calls leveraged Nim's macro and abstract syntax tree inspection tools to generate a concise compile-time syntax that reflects quantum circuit designs.
- Tested against example circuits such as super-dense coding, quantum teleportation, and the **Deutsch–Jozsa algorithm**.

Linux Daemon FMS Spring 2021

- Built **signal-intercepting, subtask-spawning** Linux daemon in **C++** with **TCLAP** and **Crypto++** for creating restorable backups on file edits within a specified directory with **encryption** support.
- Added customization for further daemon tuning by incorporating an open source C++ library: **rudeconfig**.

Tiger Compiler

- Created the tiger compiler from scratch in **SML** as described in Andrew Appel's "Modern Compiler Implementation in ML".
- Implemented phases on lexing, parsing, type-analysis, IR generation, instruction selection, liveness and register allocation, and assembly execution.

TECHNICAL STRENGTHS / SKILLS

C, C++, Rust, Fortran, Julia, Python, Java, SQL, Haskell, OCaml, SML, Nim, PHP, Javascript
Git, Github, Docker, Linux, Emacs, Qiskit, CirQ