# EMEKA NKURUMEH

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## EDUCATION

**California Institute of Technology** · Pasadena, CA
*GPA*: 3.4 · Sep 2021–June 2025

Relevant Coursework:

- Decidability and Tractability (CS 21), Algorithms (CS 38), Interactive Theorem Proving (CS 128), Programming Languages (CS 131), Compilers (CS 164)
- Calculus and Linear Algebra (Ma 1), Differential Equations (Ma 2), Abstract Algebra (Ma 5), Discrete Math (Ma 6), Graduate Probability (Ma 140)

## AWARDS

**PLMW @ POPL 2024** · Jan 2024
*ACM SIGPLAN/NSF*

**Gates Scholar** · Apr 2021
*The Bill & Melinda Gates Foundation*

**QuestBridge National College Match Scholar** · Dec 2020
*QuestBridge*

## SKILLS

**Programming Languages**

- Haskell, OCaml, Coq, C, Agda, Java, Python, Rust, x86/x86_64 Assembly, Lua, Zig, LaTeX

**Unix Operating Systems**

- Bash, Fish, Vim, Emacs, Git, gdb, Linux, various Unix command line programs

## RESEARCH EXPERIENCE

**Formally Verified CBPV Compiler**, Caltech · Jan 2024–present

- Formalized the type system and semantics of a call-by-push-value calculus in Agda and implemented a sound and complete type checker.
- Implemented a reference interpreter and started work on compiling to a small stack machine with the goal of proving them equivalent.

**Stream Type Transformers**, University of Pennsylvania · June 2023–Aug 2023

- Worked with Benjamin C. Pierce and Joseph W. Cutler on efficient type inference for a calculus of typed stream transformers based on ordered bunched logics, known as 'Stream Types'.
- Reformulated the existing system as a labeled calculus and developed a novel polynomial-time type checking algorithm in Haskell, improving over a previous exponential time algorithm.

**Site Percolation on 2D Lattices**, OSSM · Aug 2020–Dec 2020

- Worked with Jayanta Rudra on creating and optimizing a visualizer for site percolation on 2D lattices for use in calculating critical thresholds for spanning clusters.
- Started work on an interactive visualizer for site percolation in higher dimensional lattices.

## WORK EXPERIENCE

**Teaching Assistant**, Caltech · Jan 2024–present

- Graded assignments and led TA sessions.

## PROJECTS AND EXTRACURRICULARS

**Zig Programming Language Project** · Sept 2018–Sept 2023

- Contributed to standard library, various stages of the bootstrapping compiler, and improved support for non-MSVC based build environments on Windows.
- Reported several bugs and made multiple influential language proposals.

**Unlambda Interpreter** · Mar 2022

- Wrote an Unlambda interpreter using a modified CEK machine to capture and restore continuations.
- Started work on a graph rewriting based approach for interpretation of combinator-based code and compilation to imperative languages such as x86_64 assembly.