Gregory Schare

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EDUCATION

Columbia University, New York, NY May 2024
B.A. in Computer Science and Mathematics. (GPA: 3.8)
Relevant coursework: Compilers and Translators. Advanced Programming (Unix, C, networking). Data Structures (Java). CS Theory. Computer Systems. Real Analysis. Abstract Algebra. Multivariable Calculus and Linear Algebra (Honors). Discrete Mathematics. Readings in Analysis of Boolean Functions and Property Testing (with Shivam Nadimpalli); Cryptography (with Joseph Lee); Representation Theory (with Micah Gay). Macro and Microeconomics.

RESEARCH AND PROFESSIONAL EXPERIENCE

Programmer, Making and Knowing Project, Columbia University. New York, NY June 2020 – present

- Achieved 77x speedup of text analysis by replacing slow regex with XML parsing using the lxml library in Python
- Rendered dataset generation more convenient and accessible for non-technical researchers by leading refactor of legacy code from the ground up, implementing optional filters, and providing three additional data metrics
- Led archiving, data cleanup, and web presentation of student lab reports and essays using Google Drive API, Pandoc, and GNU tools while adhering to the minimal computing principles outlined by Ed and GO::DH
- Generated static sites exhibiting ongoing projects and archiving scholarly editorial discussion by augmenting Pandoc and Jekyll with custom content management and templating systems written in Haskell and JavaScript

Research Assistant, Joint Quantum Institute, Univ. of Maryland. College Park, MD June – August 2019

- Assisted in ongoing quantum computing research under the supervision of Dr. Bruce Kane
- Analyzed optimal electron beam power for increasing charge of 100nm liquid gold particle levitated in quadrupole ion trap by scattering outer electrons; computations performed using Python and simulation software CASINO
- Streamlined colleague's experiment by building laser apparatus to measure solution concentration, entirely eliminating need for 1-hour centrifuge following each test

PROJECTS

Model of Cognitive Analogy-Making in Racket, *Artificial Intelligence Honors* with Dan Anderson.
Modern functional programming implementation of Douglas Hofstadter's *Copycat* in Racket. Led eight other students and managed cooperative coding of a large project. Generated visualizations of simple character-string analogies using Racket's functional graphics library 2htdp/image. Results published in arXiv; see arXiv:1811.04747 [cs.AI].

Scheme Interpreter, *Structure and Interpretation of Computer Programs.*
Implemented a meta-circular evaluator, i.e. a Scheme interpreter written in Scheme.

Compiler for Synchronous Language. *Sparse Synchronous Language* with Professor Stephen Edwards.
Contributed to development of the Haskell compiler for a new language designed for applications with precise timing requirements with microsecond precision. Added language literals, fixed bugs, and implemented type annotations for lambda expressions. Read technical papers and worked with a team on the Haskell compiler and C runtime of sslang. See github.com/sedwards-lab/sslang.

HTTP web server. *Advanced Programming* with Professor Jae Woo Lee.
Developed HTTP web server and data server from scratch using Unix sockets API in C. Implements three-tier architecture. In addition to serving static HTML and media, the web server communicates over TCP with data server to dynamically deliver results of searching a database.

Programming Challenge in Haskell. *Advent of Code 2020.*
Solved 25 days of programming challenges. 78% pure functionally programmed in Haskell. Highlights: comonads, functional caching using lazy evaluation of infinite data structures, Chinese Remainder Theorem, parsers and domain-specific language implementations. Solutions available at github.com/gschare/aoc2020.

SKILLS

Programming languages: Proficient in C, Java, Python, Haskell, Racket. Experienced in Javascript, HTML, CSS.
Technologies: Proficient in Git, Unix, SQL, Three.js, Processing, Jekyll, Photoshop. Experienced in AWS, Digital Ocean, spaCy, Node, React, Next.js.

LEADERSHIP AND ACTIVITIES

Instructor, *Mastery Learning Hour.* Tutor K-12 students one-on-one in mathematics with a drop-in session format.
Webmaster, *Columbia Space Initiative.* Maintain statically-generated (Jekyll) club website. See columbiaspace.org.
Treasurer, *Columbia Platypus.* Manage club finances and guest speaker honorariums. Lead weekly reading group.