Nathan Sobotka

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Education

University of Pennsylvania | Philadelphia, PA *Expected 05/24*

M.S.E & B.S.E. Computer and Information Science, Minor: Mathematics | GPA: 3.98/4.00

- Coursework in data structures, algorithms, computer architecture, computability & complexity, operating systems, AI, web systems, graphics, probability & statistics, ODEs & PDEs, and linear algebra

Work

NASA Langley Research Center **Hampton, VA**

Combinatorial and Property Based Testing *May 2023 – August 2023*

- Enhanced NASA's testing methodologies through static analysis to identify chunks of code requiring additional test coverage, contributing to the reliability and robustness of NASA's testing software
- Ensured comprehensive testing by implementing randomized test generation using QuickCheck, while ensuring that the above corner cases and edge conditions were covered

Profile Guided Prefetch Guard (PG2) **Philadelphia, PA**

Research Assistant *May 2023 – August 2023*

- Dynamic insertion of cache prefetching instructions to increase efficiency under Professor Joe Devietti
- Proved PG2 was up to 1.25x faster than unoptimized code by developing a script to run PG2 through a collection of algorithms including pagerank, bfs, and sssp followed by running it over a wide variety of real and simulated benchmarks

DeepSpec NSF Expedition: The Vellvm Project **Philadelphia, PA**

REU Intern *May 2022 – January 2023*

- Compiler verification with the Vellvm Project under Professor Steve Zdancewic (GitHub: Vellvm)
- Developing a Coq monad library for public use by defining equivalence and proving fundamental theorems for the error, option, list, CPS, ID, and state monad
- Tested memory model with unit tests written in LLVM, automated tests written using QuickChick, and wrote formal proofs using the Coq Proof Assistant

University of Pennsylvania Computer and Information Science Department **Philadelphia, PA**

TA (CIS-5710) & Peer Tutor (MATH-3120, CIS-1600) *Jan 2022 – Present*

- Taught 270 students CPU design in Verilog through Computer Organization and Design. Reinforced foundational concepts for 7 individuals in Linear Algebra and Mathematical Foundations of CS
- Emphasized time management and diligent study techniques to make difficult topics more approachable

Publications

Current Hypertension Reports *March 2018*

- "Percutaneous Creation of a Central Iliac Arteriovenous Anastomosis for the Treatment of Arterial Hypertension," *Current Hypertension Reports.* Data analysis and editing
- Shadowed cardiologists as they communicated with patients, performed surgeries, and ran diagnostics

Community & Leadership

Balloon Team Software Lead | *Aerospace Club* *September 2020 – Present*

- Gather high altitude data using hand-built apps and payload. Currently planning a transatlantic launch
- Leading 7 person software team in data collection, analysis, and website development for balloon tracking

Tennis | *Penn Club Tennis* | *Fred Wells Tennis and Education Center* | *SPA* *August 2016 – Present*

- Community Service Lead for Penn Club Tennis, organizing free tennis lessons for children in Philadelphia
- Mentored and coached through TennisWorks , a program providing children free access to tennis

Technical Skills & Interests

Computer Languages	C, C++, Python, Java, Coq, Haskell, Verilog, OCaml, SQL (mySQL, Oracle), MongoDB
Interests	English (fluent), German (intermediate)
	Low-level computer science: silicon engineering, operating systems, compilers, PL.