Nathan Sobotka

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Education

University of Pennsylvania | Philadelphia, PA *Expected May 2024*
B.S.E. Computer and Information Science & Mathematics | GPA: 3.97/4.00
- Coursework in data structures, algorithms, computer architecture, computer organization & design, computability & complexity, AI, probability & statistics, ODEs & PDEs, and linear algebra

Saint Paul Academy and Summit School (SPA) | St. Paul, MN *June 2020*
ACT: 36 | National Merit Finalist | Rensselaer Medal Awardee

Experience

Vellvm Project **Philadelphia, PA**
REU Intern *May 2022 – Present*
- 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 Weingarten Center **Philadelphia, PA**
Peer Tutor *Jan 2022 – June 2022*
- Reinforced lecture concepts in math and computer science with undergraduate Penn students, specializing in Linear Algebra (MATH-3120) and Mathematical Foundations of Computer Science (CIS-1600)
- Emphasized time management and diligent study techniques to make difficult topics more approachable

Superscalar Pipelined Processor **Philadelphia, PA**
CIS-4710: Computer Organization and Design Project *Jan 2022 – May 2022*
- Implemented a 5 stage pipelined supserscalar processor in Verilog, then programmed it onto an FPGA
- Developed knowledge regarding branch prediction, caching, out of order, and multi-core processors
- Tested via a series of benchmarks, including a capstone test with 1.8 million instructions of all varieties

Publications

Journal of Emerging Investigators *January 2020*
- "The Effects of Various Plastic Pollutants on the Growth of the Wisconsin Fast Plant," *Journal of Emerging Investigators.* Research done in 2017-2018

Current Hypertension Reports *March 2018*
- "Percutaneous Creation of a Central Iliac Arteriovenous Anastomosis for the Treatment of Arterial Hypertension," *Current Hypertension Reports.* Data and graph management

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 | *Fred Wells Tennis and Education Center | SPA | Penn Club Tennis* *August 2016 – Present*
- Mentored and coached through TennisWorks , a program providing children free access to tennis
- Captained high school team during Covid, leading online gatherings and socially distanced practices
- Placed in high school state tournament, now play on the Penn Club Tennis traveling team

Hospital Volunteer | *Minneapolis Veterans Affairs Medical Center* *June 2018 – August 2018*
- Shadowed cardiologists as they communicated with patients and families and performed surgeries

Technical Skills & Interests

Computer	Java, C, Python, Coq, Verilog, LaTeX, MATLAB, OCaml, SQL
Languages	English (fluent), German (intermediate)
Interests	Silicon Engineering, Functional Programming, Data Analytics, Aerospace Engineering