

# Nathan Sochocki

[natesoch.github.io](https://natesoch.github.io) | [natesoch@umich.edu](mailto:natesoch@umich.edu)

## Education

### University of Michigan

*Bachelor of Science in Computer Engineering*

*Master of Science in Electrical and Computer Engineering*

**Ann Arbor, MI**

*Expected Grad. May 2025*

*Expected Grad. May 2026*

- GPA: **3.82/4.00**
- **Awards/Honors:** *Leinweber Software Scholarship, Lather Stefan Memorial Scholarship*
- **Course Highlights:** *Data Structures and Algorithms, Intro Logic Design, Computer Organization, Computer Security, Intro Electronic Circuits, Embedded System Design, Computer Vision, Advanced Embedded Systems*

## Relevant Experience

### Garmin International

*FPGA Design Engineer Intern*

**Olathe, KS**

*May 2024 - Aug. 2024*

- Developed a parameterized n-tap FIR filter in VHDL for use in a TCAS (Traffic Collision Avoidance System). Filtering out high frequency noise in RF data, the filter is designed to be adaptable based on the number of taps, ensuring flexibility for different system requirements. Sequenced the addition stages in the convolution process, making the number of stages parameterizable to meet timing constraints for different projects.
- Configured SPI interfaces for various devices on the FPGA hardware, utilizing ChipScope Logic Analyzer in Vivado to debug and verify functionality of simulations in Visualizer.

### Advantage Computing Systems

*Software Engineering Intern*

**Ann Arbor, MI**

*May 2023 - Aug. 2023*

- Developed a user-centered ASP.NET MVC application integrated with Orchard Core CMS to create an Azure access request form, enabling Azure hosted clients to seamlessly request permissions for their users. Implemented dynamic content types to tailor the form's display of available permissions based on each client's specific support capabilities.
- Implemented robust security features, including limiting form access to designated administrators of Azure hosted clients. Incorporated automated email functionality using custom workflows and liquid syntax.

### University of Michigan

*Instructional Aide for ENGR 101 (Intro. To Computers and Programming)*

**Ann Arbor, MI**

*April 2023 - Current*

- Responsible for teaching a weekly lab-based section of the course, providing comprehensive support to students by holding weekly office hours, offering guidance in problem-solving, debugging, and code optimization, resulting in improved student performance and comprehension in using C++ and MATLAB to solve engineering problems.
- Collaborate with course instructors and other IAs in developing and refining projects and labs, contributing to the enhancement of course content while following the design of being applicable to all engineering disciplines.

## Projects

### Bike Radar System

- Developed a bike safety system using a 24 MHz radar module to detect trailing vehicles and alert cyclists and drivers through lights and buzzers. Additionally, the system contains automatic brake lights and turn signals.
- Designed a real-time vehicle detection and alert system using two ESP32s connected via Bluetooth, leveraging FreeRTOS for fast decision-making and efficient task scheduling. The alert system contains a suite of LEDs that are adjusted based on a calculated danger level of the trailing vehicle, considering both the speed and distance.

### Automatic Guitar Tuner

- Developed an automatic guitar tuner in C on a STM32 microcontroller that uses a piezoelectric sensor to capture vibrations from the string with an ADC. Applied the Harmonic Product Spectrum technique using FFT and inverse FFT to filter out harmonics and determine the fundamental frequency of the played string.
- Designed a system using continuous servo motors attached to each tuning knob with 3D-printed components. The servos tune the string up or down based on the frequency offset. The motors are controlled using pulse width modulation to adjust their speed according to the frequency offset, with the amount of rotation determined by functions derived using linear regression on sampled data.

## Technical Skills

- **Languages/Frameworks/OS:** *C, C++, Python, MATLAB, FreeRTOS, VHDL, Verilog, Julia, C#, ASP.NET*
- **Software:** *Visual Studio/VS Code, CubeIDE, Vivado Chipscope ILA, Questa Visualizer, Quartus, ModelSim, Git*