Nick Allison

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Education

BSc. Electrical Engineering; Bsc. Computer Science; 2020 – 2026
Minor in Computer Engineering, GPA: 3.93/4.00
University of Calgary

Skills

Hardware:
Digital Design, SystemVerilog, Synopsys Tools (VCS & Verdi), Verilator, Embedded Systems, Electromagnetics Analysis, Circuit Analysis (Semiconductors, MOS Circuits), LTSpice

Software:
C++, C, Rust, Python, Java, Linux, Git / ClearCase, Bash, CMake, Make, ROS Noetic, Machine Learning

Relevant Experience

SoC Design Intern May 2023 – Aug 2024 | Markham, Ontario
Qualcomm

- CMake Implementation
  - Proposed a transition to using CMake as the new build system.
  - Led this transition and achieved a best case speed up of 85%, with 67 minutes being the previous best for compilation to 10 minutes as the new best case, or 25 minutes as the average
  - Fixed Rebuilding Process. Previously, rebuilding was not guaranteed to produce the correct binaries & libraries. After implementation, rebuilding time was reduced to 5 seconds as the new best case
- Hardware Design
  - Implemented, connected, and debugged new module instantiations
  - Created a script to list every wire and module within a module.
  - Used that script to find every instance of a counter that needed updating, and make the changes.
- Power Optimized Design
  - Implemented clock gating on DMA module for the display team.
  - Debugging 8-bit fixed point vs. 16-bit floating point power discrepancy.
  - Found other clock gating opportunities, determined whether gating was practical based on clock domain.

Robotics Engineering Intern May 2022 – Aug 2022 | Calgary, Alberta
MapaRobo

- Overhauled landscaping robot's localization and navigation on ROS Noetic and Ubuntu Linux. Solved issues with inaccurate conditions with GPS and IMU signals using PID control and A-Star planning. Kept location accuracy to within 0.02m and 3 degrees.
- Created a custom sensor fusion algorithm based on a Kalman filter in C++, as well as created a custom local path planning algorithm. Lowered accuracy degradation from 10 degrees/minute to 0 degrees/minute.
- Refined robot perception system to recognize objects at a 2x increase in distance, and lowered false positive rate by 90%.
- Designed and created a convolutional neural network with Pytorch to recognize adverse conditions with a 300% increase in performance from the previous system.

PASS Leader Jan 2021 – present | Calgary, Alberta
University of Calgary - Peer Assisted Study Sessions

- Mentored and tutored first-year engineering students, understanding their levels of understanding. Improved grades of regular attendees by an average of at least 1 letter grade.
- Spoke publicly to 40 - 200 attendees and worked as a team with another PASS leader.

Private Tutor Sep 2020 – present

- Tutoring in courses ranging from Grade 10 science and math to Digital Systems Design.
  - "I got my math test back last week. I got 96% and my average was 98% which is a good improvement. Thank you for your help this year."
  - "hey nick! just wanted to say thanks for ur help this semester, i got an 100 on my physics final :)"
  - "I got 90 on my math final!! Thank you so much for your help this semester"

Additional Experience

Software Team Lead Jul 2022 – Apr 2023 | Calgary, Alberta
Alberta Collegiate Robotics - Canis Quadruped Team

- Managed a team of 4+ software engineering students, and increased productivity from the previous team using Agile Design practices including Kanban and hands-off mentoring.
- Created forwards and inverse kinematics models for robot legs and body in C++.
- Implemented a walking gait model for locomotion using an IMU and PID control for orientation and balance.

VP Academic Jun 2022 – Sep 2022
DeepRacer Calgary

- Developed an intro to math, coding, and machine learning curriculum covering topics from high school trigonometry to advanced Reinforcement Learning, including Q-Learning, Proximal Policy Optimization, and Soft Actor-Critic.
- Helped run competitions to which 200+ people attended and helped network and market the events.

Projects

Robot Hand, Helping Hands 🔗 Jan 2023 – Apr 2023

- Led a team of 6 people to create and program a robot hand to translate speech into sign language.
- Used ROS and C++ to program and control the robot, and natural language processing to transcribe the speech

Signal Generator 🔗 Dec 2022

- Created a signal generator with an FPGA.
- Used a linear interpolation core to run at frequencies from 1Hz to 1MHz at 1Hz steps
- Used an R2R Ladder Digital-Analog-Converter to generate the sine wave
- Later updated to build and run with Verilator

Note Linker and Markdown File Parser 🔗 Jun 2024

- Created a plugin to parse markdown files and find links between notes.
- Created custom data structure to efficiently find links between files.
- Links 658 files in 4.70 seconds when running with no cache, or 0.12 seconds when using serialized file loader, and windows cache

Python Scripter for Obsidian 🔗 Aug 2023

- Created a plugin for the Program Obsidian to allow the user to use their own custom python plugins to interact with Obsidian.

Huffman Coding Algorithm 🔗 Nov 2022

- Implemented a Huffman coding algorithm in C.

Wordle Solver 🔗 Feb 2022

- Used C++ to most efficiently solve wordle with an average of 4.0 guesses.
- Chose the word with the highest weighted sum of likelihoods of its possible states as the next most likely guess.

Root Finding Algorithm Dec 2021

- Implemented using C++ to find all roots, real and imaginary, of an arbitrary degree polynomial.
- Used a Gradient Descent method on a grid of points in the complex plane until a certain local minimum is detected.

Node Voltage Calculator Sep 2021

- Developed a calculator to solve a circuit using the node-voltage method using the Eigen library for C++.

References

Available Upon Request