Andrew Chen

nullcline nullcline.github.io nullcline@protonmail.com Vancouver

Key Skills

Software
Python, C++, C, Rust, OpenCV, Pandas, PyTorch, ROS1/2, Linux, Prompt Engineering, Googling

Electrical
Altium, SystemVerilog, LTSpice, Oscilloscopes/Logic Analyzers, Reading Datasheets

Mechanical
SolidWorks, Onshape, 3D Printing, Laser/Waterjet Cutting, Machining, Could probably learn to weld

Work Experience

Software Engineering Intern, *Marathon Fusion* 08/2023 – 09/2023
- Implemented a Python model of the tritium fuel cycle of a tokamak to inform future architecture decisions.
- Performed literature reviews of different tritium compatible pumps, ranging from cyrocondensation to liquid ring.

Sensor Design/Integration Engineering Intern, *Tesla* 09/2022 – 01/2023
- Assisted with testing GNSS performance, IMU noise mitigation, and occupant classification algorithms by performing data analytics, automating data collection/processing, and identifying possible root causes/solutions.
- Utilized Plotly, Dash, FastAPI, S3, and PostgreSQL to perform full stack development of a GNSS data visualizer, a car data logger, and various other internal tools to help support ongoing validation efforts.

Diagnostics and Controls Engineering Intern, *General Fusion* 05/2022 – 09/2022
- Wrote, unit-tested, and validated a series of Python APIs to allow for experimental use of various digitizers, including NI DAQs, in-house designed high-speed electronics, and other precision measurement devices.
- Architected and wrote code for controlling a distributed system of PLCs using Python, MQTT, and TwinCat3.
- Created multiple GUIs using PySide6 to streamline the manual control and allow for live data visualization for various instruments, ranging from high-speed oscilloscopes, to hundred-channel digitizers, to infrared cameras.

Avionics Tech Lead/Project Manager, *UBC AeroDesign* 03/2021 – Present
- Leading a multidisciplinary team of 26 students through the design, manufacturing, and testing of power, embedded, and software systems for two fixed-winged airplanes, as entries for the SAE AeroDesign competition.
- Designing system architecture, performing design reviews, writing a Systems Engineering Management Plan/requirements/ConOps, conducting FMEAs, making timelines, and leading meetings.
- Guiding students through the engineering design process and teaching them about computer vision, machine learning, RF communication, PCB design, embedded programming, and various hands-on skills.

Systems Engineering Intern, *General Fusion* 05/2021 – 12/2021
- Worked with the Systems Engineering team to help manage the complexity of designing and building a novel nuclear fusion reactor through requirements management, interface definition, and performing various analyses.
- Worked under Chief Scientist to conduct experiments and research interactions between liquid lithium and materials ranging from calcium aluminate glasses to polyimide-matrix carbon fiber composites.

Software Engineering Intern, *EyeCloud* 01/2020 – 04/2020
- Prototyped a real-time medical imaging device running off a Raspberry Pi 3, using the OpenVINO toolkit and an Intel Neural Compute Stick in order to run a Tiny-YoloV3 model on the edge for live results at usable framerates.

Projects

Ultrasonic Levitator, *Altium, SystemVerilog, Python, C, C++*
- Designing the hardware and software for a phased array of ultrasonic transducers driven by a Cyclone 10 used to move particles in 3D space in order to create a multi-media volumetric display as a senior capstone project.

Monarch Avionics, *Python, Raspberry Pi, Rust, OpenCV, Altium*
- Architecting and implementing an embedded system capable of geolocating and accurately landing an autonomous drone onto 2' diameter markers from a moving aircraft for the SAE AeroDesign competition.
- Comprised of a custom RTK capable sensor board running off an STM32F4, 915MHz and 5Ghz communication streams, a geolocation algorithm that utilizes ML and computer vision, and a suite of web and QT based GUIs.
- Writing ground software, firmware for STM32, designing PCBs, modeling mechanical interfaces, and more.

Fuel Cell Monitoring System, *Circuit Design, KiCAD, C++, C*
- Designed, manufactured, and tested an electrically-isolated, high-voltage, modular, and cost-effective fuel cell monitoring system in a team of four as a sophomore capstone project for FuelCell Energy.

More Projects

Lazarus, *Python, LLMs, Buzzwords*
- Fine-tuned Mistral's 7B LLM on personal data sourced from social media platforms, journals, and homework.
- Used OpenAI's GPT-4 API to assist in labelling, and used QLoRA to enable training on a single A10G GPU.

Plasma Torus, *Altium, LTSpice, RF Engineering*
- Assembled and tuned a 10MHz HFSSTC circuit to drive an inductively coupled plasma toroid in a xenon globe.
- Created and simulated a circuit in Altium, brazed copper pipes for secondary winding, and 3D printed a stand.

Mantine Avionics, *Arduino, Java, Python, React*
- Evaluated and implemented new sensors, redesigned the telemetry system to use radio instead of cellular data, and added new features to a React-based GUI for the avionics system of a fixed-wing RC aircraft.

Ultralight Rover, *KiCad, Onshape*
- Rapidly designed the electrical system, drive system, and PCB for a lightweight autonomous rover which comprised of an ultrasonic sensor, IMU, H-bridge, and Raspberry Pi Pico.

License Plate Scanning AI, *OpenCV, ROS, Gazebo, Tensorflow*
- Programmed a robot the ROS framework that used imitation learning to drive autonomously inside a Gazebo simulation, and was able to detect and read license plates using OpenCV and a CNN built with TensorFlow.

Can Return Bot, *Circuit Design, C++, SolidWorks, 3D Printing*
- Designed an H-Bridge and various mechanical components for a PID-based line-following robot capable of picking up stray aluminum cans from the ground and returning them to a pre-determined collection bin.

3D Printed Monitor Arm, *Solidworks, 3D Printing*
- Designed a custom VESA compatible dual-monitor stand using 3D printed components and aluminum rods.

Fizz Discord Bot, *Python, discord.py, MongoDB*
- Programmed a bot for music playing, moderation, organization, and linked it to a MongoDB to collect statistics.

Every Evangelion Frame, *Python, OpenCV, AWS*
- Automated a script to sequentially post every unique frame of the anime Neon Genesis Evangelion to Facebook.

Personal Websites, *Javascript, HTML/CSS, Three.js, Phaser 3*
- Created a landing page using Three.js that displays an animation of a modified 3D Lorentz Attractor.
- Created a simple 2D platformer with bullet physics using Phaser 3 as a way to navigate through personal website.

Extracurricular Experience

President, *UBC Engineering Physics Undergraduate Society* 09/2022 – Present
- Leading the Engineering Physics Student Council by delegating tasks, planning events, dealing with bureaucracy, and communicating with faculty in order to make a positive impact on the engineering program.
- Representing Engineering Physics within the greater Engineering Undergraduate Society Council by participating in meetings, collaborating with other departments, and serving on an executive improvement committee.
- Organized over $10,000 worth of merchandise sales, assisted in the planning of the Graduate School Information Night, FIZZ and IGEN Career Fair, 2nd Year Orientation BBQ, and various smaller events.

Applied ML Teaching Assistant, *UBC Engineering Physics* 01/2023 – 04/2023
- Served as a teaching assistant for ENPH353, a project course where students learn to apply machine learning, computer vision, and robotics simulation techniques in order to design an autonomous vehicle.
- Performed code reviews and provided support for students during lab sessions that require live-programming.
- Held office hours to assist students with conceptual questions about machine learning and computer vision, as well as technical challenges related to Python, OpenCV, Linux, Tensorflow, PyTorch, and Gazebo.

Recent Courses

PHYS 410
Computational Physics

PHYS 408
Optics

PHYS 474
Solid State Physics

PHYS 401
Electromagnetic Theory

ELEC 401
Analog CMOS IC Design

MATH 400
Applied PDEs

PHYS473 (Enrolled)
Nuclear Physics

ELEC 404 (Enrolled)
RF Integrated Circuits

Education

University of British Columbia, *B.ASc, Engineering Physics* 09/2018 – 05/2024 (Expected)
Vancouver, Canada