

Nelson Ooi

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Cornell University B.S. in Electrical & Computer Engineering (May 2024)

M.Eng. in ECE intended (Dec 2024)

GPA: 4.0/4.0

1st place student in ECE cohort (2023)

Relevant Courses *currently taking. Attained As in all completed courses.	Quantum Physics & Engineering*	Quantum Information Science*	RF Systems*
	Microelectronics	Electromagnetic Waves & Photonics	Digital VLSI IC Design
Skills & Languages	Scientific computing Python, 7+ years, MATLAB 1+ years (fluent: Pandas, Numpy, Qiskit, etc.)	Object-oriented programming C++ & C, 5+ years Java, 1+ years	Hardware Design Tools Virtuoso 1+ years Verilog 2+ years

Awards & Certifications

- Member of Tau Beta Pi Engineering Honor Society, member of IEEE Eta Kappa Nu Honor Society.
- [Cornell University Sustainability Project of the Year \(2022\)](#) for developing [a marketplace platform app \(see Swapp entry\)](#).
- [Department of Energy Marine Energy Collegiate Competition Best Paper](#) (2023, was a lead author).

Quantum Information Science

- Certifications: [IBM Qiskit Advocate](#) (2023), [IBM Certified Associate Developer - Quantum Computation using Qiskit v0.2X](#) (2023).
- Attained advanced qualifications: [Qiskit Spring Challenge 2023](#), [Qiskit Global Summer School 2023 Excellence Badge](#).

Co-founder & Mentorship Lead, Quantum Computing Association, Cornell University. July 2023 - present

- Launched Cornell University's first quantum-centered student association with the aim of education, outreach, and career advising.
- Currently teaching my [self-designed course](#): 'Fundamentals of Quantum Computing', to beginner members.

Research

Trapped-ion Researcher, Photonics & Quantum Electronics Group (Prof. Karan Mehta), Cornell University. January 2023 - present

- Devised novel permanent magnet optimization algorithm for generating high-homogeneity magnetic fields to improve trapped-ion qubit coherence. Improved B-field inhomogeneity $\sim 1000\times$, from 100ppm to 0.004ppm in Python simulations.
- Implemented optics fiber noise cancelation system for 729nm laser. Gained extensive experience using passive (polarizers, beamsplitters) and active (AOM) optics elements alongside diagnostic tools (beam profilers, oscilloscopes) to implement beam path.
- Currently investigating ion confinement by optimizing trap electrode potentials using Python-based electrostatics simulations.
- I am one of only four undergrads invited to present their research to the distinguished [Cornell Engineering College Council](#) in 2023.
- Invited to [MIT Undergraduate Research Technology Conference 2023](#), and [Cornell Undergraduate Research Board Fall Forum 2023](#).

Hardware Engineering Projects

Digital Logic VLSI Integrated Circuit Module Design in Cadence Virtuoso. January 2023 - June 2023

- Designed transistor-level schematic and layouts in 90nm PDK for: 8-bit ripple/PTL adders & registers. Optimized area-delay product.
- Gained significant experience with DRC workflow; and devised 24 test suites: created auto-testing software in VerilogA & MATLAB.
- I was invited by Prof. Edwin Kan to create a [tutorial for Cornell's VLSI course](#), and will be a Teaching Assistant in Spring 2024.

Photonics Waveguide Design & Simulation in KLayout and MATLAB. March - May 2023

- Designed a 4-to-4 multi-mode interferometer in KLayout, achieved even power splitting (15-30% per output port) in simulation.
- Implemented FDTD beam-propagation method in MATLAB to simulate MMI's performance under single-mode excitation.

300W Wave Energy Power Relay PCB in KiCAD & Embedded System Control, SEA Lab, Cornell University. February - May 2023

- Designed a 2-layer, 300W-rated power supply PCB for a wave energy-powered electricity generator for Cornell's SEA Lab.
- Created module footprints; designed schematic and completed PCB place and route in KiCad with design for testing.
- Led PCB bring-up by soldering, conducting unit tests and integrating microcontroller; held design reviews with mechanical teams.
- Engineered finite-state machine in C to manage power routing, enabling user control and safe power-down in unlikely emergencies.

Software Engineering

Founder & Full-stack Developer Lead, Swapp, campus marketplace app. January 2021 - June 2022

- Founded, led, and coached app dev team of 10 members to create Swapp, the [2022 Cornell Sustainability Project of the Year](#).
 - Swapp is a marketplace app for students to trade pre-loved items, designed to kickstart a circular economy on campus.
- Built app from scratch: developed frontend in React Native and Expo, using React Hooks and best practices for stateful UI.
- Built backend in Firebase: consisting of database, backfill scripts, and query indices, with full text search integration in Algolia.
- Scaled app user base upwards of 150 new users in 4 months, gaining significant experience in project management and app dev.

Full-Stack Developer Intern, Snackpass, food ordering & restaurant platform backed by Y Combinator. June - August 2021

- Engineered a new full-stack (front and backend) feature for the platform's storefront purchase system using React Native (written in React Redux, TypeScript) and NodeJS within a 3-person project team; enabling Snackpass to onboard a crucial business partner.
- Completed 20+ feature tickets, gaining significant experience in pair-programming, PR reviews, and CI/CD workflow in GitHub.
- Developed new server-side methods for time-sensitive transactions and notifications, wrote test suites in Jest to verify correctness.