



Undergraduate Researcher

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Education

August 2020 - May 2024 **Cornell University**
Ithaca, New York
Bachelor of Science in Electrical and Computer Engineering

Academic & Research Experience

- January 2023 - present **Undergraduate Researcher, Advisor: Professor Karan Mehta**
Photonics and Quantum Electronics Group, Cornell University
- Researched high-coherence control methods for trapped-ion qubits.
 - Developed numerical simulations to optimize surface electrode trap potentials for stable ion confinement.
 - Created novel permanent magnet geometry optimization algorithms to generate high-uniformity magnetic fields, improving non-uniformity by ~1000x in simulation. These would serve to mitigate ion qubit dephasing under shuttling in practice. Gained significant experience using Python for numerical simulation and optimization.
 - Designed and implemented laser fiber-noise cancellation system in experimental setup to improve beam coherence. Attained proficiency using optics equipment, including AOMs, polarizers, beamsplitters, and beam profilers.
 - Collaborated with colleague to build remote lab monitoring & logging database using InfluxDB and Python.
- August 2017 - January 2018 **Visiting Student Researcher, Advisor: Professor Tony Quek**
Singapore University of Technology and Design
- Developed machine learning-integrated embedded systems for human activity recognition to improve safety of at-risk persons. Collected and characterized movement data for a variety of activities (e.g. sitting, walking, climbing stairs) using embedded networked sensors. Designed and trained self-designed Tensorflow LSTM deep neural networks and support vector machines (SVMs) on processed data to categorize activities using real-time sensor inputs with accuracy >97%.

Professional Activities

Conference presentations (Posters)

- 2023 **'Validation of Surface-electrode Ion Trap for High-coherence Quantum Information Processing'**.
Invited poster presentation (co-author) at the *Cornell Quantum Computing Association IBM Qiskit Fall Fest*, Cornell University, Ithaca, New York, USA, November 2023.
- 2023 **'High-uniformity Magnetic Field Optimization for Trapped-ion Quantum Devices'**.
Invited poster presentation (first-author) at the *Cornell Undergraduate Research Board Fall Forum*, Cornell University, Ithaca, New York, USA, November 2023.
- 2023 **'High-uniformity Magnetic Field Optimization for Trapped-ion Quantum Devices'**.
Invited poster presentation (first-author) at the *IEEE MIT Undergraduate Research Technology Conference*, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA, October 2023.
- 2018 **'Artificial Intelligence-based Human and Machine Sensor Networks'**.
Finalist poster presentation (first-author) at *Singapore Science and Engineering Fair*, Singapore, March 2018.

Presentations (Talks)

- 2023 **'High B-field Uniformity & Fiber Noise Cancellation for Trapped-ion Quantum Devices'**.
Invited talk, [Cornell Engineering College Council](#), October 2023.

Teaching Experience

- September 2023 - present **Student Lecturer, Fundamentals of Quantum Computing**
Quantum Computing Association (Student Organization, Co-Founder), Cornell University
▸ Taught >20 students the basics of Dirac notation, quantum circuits and algorithms.
- June 2023 **Tutorial Creator & Teaching Assistant (Spring 2024), Cadence Virtuoso VLSI Design**
Cornell University
▸ Invited by Professor Edwin Kan to create a tutorial for the Cornell University course ECE 4740: VLSI Design, detailing the use of VerilogA and MATLAB to automate module verification in testing in Virtuoso.
▸ I will be working with Professor Edwin Kan as a Teaching Assistant for ECE 4740 in the Spring 2024 semester.

Industry Experience

- May 2021 - August 2021 **Full-Stack Software Developer Intern**
Snackpass
▸ Engineered a new full-stack (front and backend) feature to the platform's storefront purchase system using React Native (Redux, TypeScript) and NodeJS within a 3-person project team, enabling Snackpass to onboard a crucial business partner. Engaged in design and review processes with cross-cutting development teams, created PR reviews, and gained experience using the CI/CD workflow in GitHub. Developed test suites using Jest to verify server-side methods for time-sensitive transactions and notifications.

Professional Projects

Hardware Engineering

Jan 2023 -
May 2023

Cadence Virtuoso VLSI Digital Logic Design

- Created transistor-level schematic and layout for a variety of digital logic modules: 8-bit ripple-carry and PTL adders, registers. Utilized 90nm PDK and performed parasitic extraction, transient timing analysis, with LVS & DRC on module designs. Optimized area-delay product of modules. Devised 24 test suites and implemented test module in VerilogA, created MATLAB script to automate device waveform verification.

Feb 2023 -
May 2023

300W Power Routing PCB for Wave Energy Electricity Generator

- Designed schematic and layout in KiCAD for 300W-rated PCB used to route power from a wave-powered renewable energy generator. Engaged in multiple rounds of design review in multidisciplinary engineering team, and contributed in selection of the bill of materials. Designed and programmed a finite-state machine for power routing relay control under different generation conditions, using embedded C running on an STM microcontroller.

Leadership

August 2023 -
present

Co-Founder and Vice-President of Careers & Mentorship

Quantum Computing Association, Cornell University

- Co-founded Cornell University's first student association on the field of quantum information science.
- Designed introductory curriculum to teach new members about the fundamentals of linear algebra, quantum algorithms, and quantum hardware.
- Reached >80 student members in the first semester of establishing the group.

August 2020 -
June 2022

Founder and Team Lead

Swapp development team (a.k.a. Alternative Recycling Cornell), Cornell University

- Founded [Swapp](#), a student marketplace platform app (available on iOS) designed to reduce dorm waste and create a circular economy on campus by facilitating buying/selling/exchanging preloved items.
- Built frontend in React Native and Expo; implemented backend database (Firebase) and full-text search (Algolia). Led overall design team of 10 members; coached team of 3 developers in full-stack app development. Oversaw user acquisition to scale Swapp by upwards of 150 new users within 4 months.

January 2019 -
May 2020,
June 2022 -
November 2022

Platoon Commander (Lieutenant)

Singapore Armed Forces

- Led a platoon of over 40 soldiers during compulsory conscription (total 22 months) to facilitate peacetime logistics functions, and ensure soldier readiness. Assisted the head manpower officer of a logistics battalion in personnel management tasks. Attained the rank of lieutenant, becoming a commissioned army reserve officer. Embarked on gap semester from June-November 2022 to complete required service.

Honors and Awards

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| 2023 | 1st place in cohort , School of Electrical and Computer Engineering, Cornell University, <ul style="list-style-type: none">▸ Awarded John G. Pertsch Prize for ranking 1st in the ECE major in the third year of undergraduate study. |
| 2023 | Invited to speak at Cornell Engineering College Council (ECC) Meeting <ul style="list-style-type: none">▸ <u>One of only four students</u> selected to present their undergraduate research to the ECC. |
| 2023 | IBM Qiskit Advocate - 1 of 500 worldwide <ul style="list-style-type: none">▸ Selected by IBM for active contributions to the IBM Qiskit community, and demonstrating proficiency in developing quantum computing algorithms. |
| 2023 | Department of Energy Marine Energy Collegiate Competition Best Paper <ul style="list-style-type: none">▸ Co-lead author on 'AquaPower: Harnessing Wave Energy for Offshore Aquaculture'. |
| 2023 | Cornell University Engineering Learning Initiatives Undergraduate Research Grant <ul style="list-style-type: none">▸ Awarded in April 2023 and in September 2023. |
| 2023 | Dean's List, Cornell University College of Engineering <ul style="list-style-type: none">▸ Awarded to top students in the College of Engineering; attained Fall 2020, Spring 2021, Fall 2021, Spring 2022, Spring 2023. (On gap semester Fall 2022). |
| 2022 | Cornell University Sustainability Project of the Year (2022) <ul style="list-style-type: none">▸ <i>'This award recognizes student organizations for planning and implementing an outstanding project, initiative, or campaign for the Cornell community; a project that embodies the sustainability mission of the organization.'</i>▸ Awarded for creating Swapp and leading its development. (Please see Leadership entry). |

Certifications

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| 2023 | IBM Certified Associate Developer - Quantum Computation using Qiskit v0.2X |
| 2023 | IBM Qiskit Global Summer School 2023 Excellence Badge - Advanced |
| 2023 | IBM Quantum Challenge Spring 2023 Achievement - Advanced |
| 2022 | VLSI CAD Part I: Logic
Coursera <ul style="list-style-type: none">▸ Course on Computational Boolean Algebra and Logic Synthesis for VLSI software. |

Professional Society Memberships

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| 2023 - present | Member, Tau Beta Pi Engineering Honor Society |
| 2023 - present | Member, IEEE Eta Kappa Nu Honor Society |
| 2023 - present | Member, Institute of Electrical and Electronics Engineers (IEEE) |

Skills

Proficient in:

Hardware Engineering	Cadence Virtuoso	KiCAD	KLayout	Verilog
Experimental Simulation & Software Languages	Python (7+ years) <i>Matplotlib, Numpy, Scipy, Qiskit, and more.</i>	MATLAB (1+ years)	C++ (3+ years)	C (2+ years)
App Development	Typescript (1+ years)	Javascript (3+years)	React, React Native (3+ years)	Expo (3+ years)
Database Development	Firebase (3+ years)	InfluxDB (1 year)		

Coursework

Attained As in all completed courses. Relevant courses shown, currently taking those marked with '*'.

Quantum Physics and Engineering*	Quantum Information Science*	Photonics	Electromagnetic Waves
Oscillations, Waves, Quantum Physics*	Radio Frequency Systems*	Signals and Systems*	Microelectronics
Object-Oriented Programming	Embedded Systems	Digital Logic Design	VLSI Design