Hugo Onghai

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Education

Cornell Tech, Cornell University | New York, NY *Expected May 2026*
MEng in Electrical and Computer Engineering — GPA: 3.953
- Cornell Tech Merit Scholarship (2025)
- **ML & Robotics Coursework:** Applied ML, Distributed Optimization, Intelligent Autonomous Systems, Multivariable Control

University of California, Los Angeles (UCLA) | Los Angeles, CA *June 2025*
BS in Materials Engineering, specializations in Electronic Materials & Math of Computation — GPA: 3.975, summa cum laude
- 5x Dean's Honor List, Knapp Scholarship for Ceramics Studies (2023), Chin Family UCLA Endowed Engineering Scholarship (2024)
- **MSE Coursework:** Electron Microscopy, X-Ray Diffraction, Metallic Alloys, Ceramics and Glasses, Computer Simulations for Materials, ML for MSE, Diffussion and Diffusion-Controlled Reactions, Electronic Materials Processing
- **Math/CS Coursework:** Discrete Structures, Honors Proof-Based Linear Algebra, C++ Data Structures, Differential Equations

Technical Skills

- **Programming Languages:** Python, LaTeX, Markdown, MATLAB, C++, Java, YAML, MongoDB Query Language, Go
- **Software Systems and Tools:** Git, GitHub, Overleaf, MikTeX, MS Office Tools, Powershell, Anaconda Prompt, Arch Linux
- **Materials Science Equipment:** EIS, CV, XRD, XRF, OM, SEM, TEM, Tensile Test, 3-Point Bend Test, Impulse Excitation, Plasma Oven, Photolithography, Dry/Wet Etching, LPCVD, 3D-Printing, CAD Autodesk Fusion

Professional Experience

Software Engineer Intern | The Materials Project | *Lawrence Berkeley National Lab, CA* *June 2025 – August 2025*
- Developed and published an open-source python package, MPCite, interfacing with the DOE Office of Scientific and Technical Information's E-Link API to submit, update, and validate DOI numbers for 100,000+ database entries
- Orchestrated with Dagster, parallelized with dask, and queried internal AWS database with pymongo and MongoDB Atlas (MQL)
- Supported CI/CD efforts with Git source-controlling and by deploying a documentation GitHub Pages website with mkdocs
- Built automated linting, testing, and publishing workflows with GitHub Actions, that uncovered 2 bugs in the DOE's API

Bioelectronics Research Intern | Forschungszentrum Jülich | *Jülich, Germany* *June 2024 – September 2024*
- Awarded internationally competitive DAAD RISE scholarship (13% acceptance rate) to work at one of Europe's largest research centers
- Ran electrochemical deposition to build penetrating electrodes onto neural implants for deep brain stimulation to mitigate Parkinson's
- Made *in-vitro* accelerated aging test setup to study stability and degradation of neural implant performance over time
- Measure function and failure with electrochemical impedance spectroscopy, charge injection capacity, and optical microscopy
- Analyzed 90 days of time series performance data across over 20 implants with galvani, Matplotlib, seaborn, NumPy, and pandas
- Identified key modes of failure in the design such as water intrusion, electrode delamination, and fragility after autoclave sterilization

Research Experience

IBM Research Scholar | *Ab Initio* Simulations Lab @ UCLA | *Los Angeles, CA* *September 2023 – June 2025*
- Participated in an IBM-funded undergraduate research program focused on density functional theory simulations of electronic materials
- Wrote internal MATLAB scripts to visualize graphene band structures with MSPARC, a finite-difference real-space DFT package
- Gave progress updates to the Semiconductor Research Corporation and presented work to faculty and peers at UCLA Research Week

Research Intern | Center for Thermal Spray Research at Stony Brook University | *Stony Brook, NY* *July 2022 – August 2022*
- Applied impulse excitation technique to characterize elastic modulus of 50+ metal and ceramic thermal spray coatings samples
- Fabricated alumina coatings with controlled porosity by systematically varying spray distance and an aluminum phosphate sealant
- Visualized crack propagation and strain in spray-coated samples undergoing three-point bend testing with MATLAB

Simons Fellow | Nagan Research Lab | *Stony Brook, NY* *June 2021 – August 2021*
- Performed molecular dynamics (MD) on a benchmark set of RNA stem-loop structures to evaluate implicit solvent model accuracy
- Used the AMBER software suite on remote multi-GPU Linux Machine to execute and analyze MD simulation trajectories
- Found good torsion bond angle alignment of RNA stem-loops when compared with NMR experimental ground truth data
- Co-authored: Linzer et al., Accurately Modeling RNA Stem-Loops in an Implicit Solvent Environment. J. Chem. Inf. Model, 2024

Research Assistant | Garcia Center for Polymers at Engineered Interfaces | *Stony Brook, NY* *June 2020 – September 2020*
- Characterized biosensors with molecular-imprinted self-assembled monolayer films for influenza and COVID-19 virus detection
- Quantified silicon wafer roughness with atomic force microscopy, informing monolayer crystallization and virus adsorption behavior

Projects

Machine Learning Kernel (C, Bash, Git, Linux) *December 2025*
An ML Kernel implementing standard, optimized, and profiled neural network operations
- Implemented core functions for a machine learning kernel: matrix multiplication, convolution, ReLu, etc.
- Optimized matrix multiplication with tiling, blocking, quantization, sparsity, and multi-threading, demonstrating 12× speedup
- Halved GPT-2's time to first token by re-implementing fully-connected layer matrix multiplication with Intel vectorized instructions

Lightweight Simon Block Encryption Engine Design *December 2025*
An ASIC implementation of the Simon 32/64 Block Encryption optimized for power, performance, and area
- Implemented Simon encryption cipher designed for mobile and internet-of-things applications with a 32-stage pipeline in SystemVerilog
- Completed Synopsys Design Compiler design synthesis, Cadence Innovus automatic place-and-route, and Calibre physical verification

• Achieved the 4th best optimization in the class by minimizing total latency, power consumption, and area

MPCite (Python, YAML, pymongo, Dagster) *August 2025*

A Python package to submit new database entries to OSTI's DOI Number Service

Chalk 2.0 *June 2025*

A senior capstone project to characterize, manufacture, and validate superior blackboard chalk

- Led a comprehensive market landscape assessment of the chalk industry, benchmarking production methods, environmental footprint, and user health considerations across premium and value tiers
- Prototyped a chalk manufacturing process, optimizing writing quality via systematic variation of composition and processing conditions
- Applied ASTM-standard characterization techniques such as XRD and 3-point bending to compare our samples with commercial chalk
- Experimented with polymeric coatings and binders on calcite- and gypsum-based chalks to improve writing strength and reduce dusting

Manimolcov (Python, Git, Manim) *Decemeber 2024*

A Python package to visualize molecular graph convolutions for educational purposes using 3Blue1Brown's Manim

- Built functions to import molecule files into the Manim animation engine and to perform graph convolutions on their structures featurized with one-hot encodings

Additional Volunteering & Work Experience

Volunteer Peer Notetaker | UCLA's Center for Accessible Education | *Los Angeles, CA* *January 2025 – March 2025*

- Assisted students with disabilities by sharing high quality, comprehensive course notes twice a week on Engineering Ethics

Student DJ | UCLA Women's and Men's Volleyball Marketing Team | *Los Angeles, CA* *May 2023 – June 2024*

- Curated, played, and remixed music for UCLA D1 Men's and Women's Volleyball Games to keep fans engaged and entertained
- Worked with stadium sound systems and live performers in a fast-paced, high-intensity work environment

Gravedigger and Ground Laborer (Seasonal) | Cedar Hill Cemetery | *Port Jefferson, NY* *August 2023 – June 2024*

- Performed 40+ funeral and burial services in first 2 months, helping people in emotional distress during the hardest times of their lives