Jack D. Carson

Interested in drug development, deep learning, and physics | jdcarson@mit.edu | quothbonney.github.io

Education

Massachusetts Institute of Technology — Cambridge, MA
B.S. in EECS and Physics — *2024 — Present*
- GPA 5.0/5.0. Coursework: ML for Molecular Engineering, Algorithms, Probability, Linear Algebra and Optimization Theory, Modeling with ML, Differential Equations, Molecular Engineering Lab

University of Tulsa — Tulsa, OK
Concurrent Student, Electrical Engineering — *2022 — 2024*
- GPA 4.0/4.0. Only high school student in full EE course sequence.

Booker T. Washington High School — Tulsa, OK
High School Diploma — *2020 — 2024*
- GPA 4.0/4.0 unweighted, 4.78 weighted. Valedictorian.

Research Experience

MIT CSAIL – Barzilay Group — 2025 — Present
Undergraduate Researcher — *Cambridge, MA*
- Only freshman selected for Regina Barzilay Group. Buildling foundation models for metabolomics with Peter Mikhael and Itamar Chinn. Individually designed a new compiled programming language (Omicron) for declarative querying of terabyte-scale biology datasets with graphs and hypergraphs natively used as first-class abstractions. Omicron v. pre-alpha currently open-source. Dataset to be published in early 2026.

Memorial Sloan-Kettering Cancer Center — 2025 — 2025
Research Intern, Cheung Family Scholar, Summer 2025 — *New York, NY*
- Led design and pretraining of 300M-param epigenetics foundation model in Christina Leslie Lab. Applied sparse dictionary learning to pretrained model to uncover novel systems biology mechanisms. New foundation model significantly improved performance of other relevant applied ML techniques in lab. Work under review in Cell.

MIT McGovern Institute for Brain Research — 2023 — 2025
Undergraduate Researcher — *Cambridge, MA*
- Hired as high-school senior after RSI program to design generative models for 3D fMRI denoising and protein biomarker synthesis with Itay Fayer and Kevin Chung. Continued through spring 2025.

MIT Social and Ethical Responsibilities of Computing — 2024 — Present
Research Fellow — *Cambridge, MA*
- Applying statistical physics to language model behavior at long time-scales. Oral presentation at EECS Town Hall. Accepted ICML R2-FM poster.

Professional & Global Engagement

MIT PKG Public Service Center — 2024 — Present
Priscilla King Gray Fellow — *Cambridge, MA*
- Led 125k fundraising from the McGovern Foundation for rural tech education in Native communities and personally spearheaded first partnership between MIT and the Cherokee Nation. Director of MIT TASC native outreach program in collaboration with tribal partners and UTulsa.

United Nations Summit of the Future — 2024 — 2024
AI Policy Delegate — *New York, NY*
- Represented MIT at intergovernmental meetings focused on responsible AI and sustainable development goals. Collaborated with NGOs and UN staff on policy memoranda.

Selected Honors

- **Elie Wiesel Prize in Ethics, 1st Place** (2025) Widely held as a top international writing contest in continental philosophy.
- **White House Presidential Scholar** (2024) Top national honor for academic and community excellence
- **Research Science Institute Scholar** (2023) Selective international STEM research program at MIT for high school students.
- **MIT Brain-Computer Interface Competition**, 3rd Place (2024) Campus-wide EEG neurotech design competition
- **Multiple Native American Scholarships** (Cobell, Accenture, Aristocrat, IPEF, Intel, OK Academic All-State)

Publications

First Author, A Statistical Physics of Language Model Reasoning — ICML 2025 R2FM
Author, Maintaining Electrochemical Performance of Flexible ITO-PET Electrodes under High Strain — Published in ACS Omega
Author, The JDVC Multivariable Calculus Cookbook — Published on Amazon

Skills

- **Programming**: C/C++ (5yrs), Python (5yrs), Rust (3yrs), PyTorch (3yrs), CUDA (1yr), Bash, Git, JavaScript/TypeScript, MATLAB
- **ML/Math**: Foundation Models, Numerical Opt., Probabilistic Models, ODE/PDEs, Graph ML, Stochastic Processes, Simulation
- **Systems**: HPC, GPU Computing, Parallel Programming, Low-Level Debugging, Systems Design
- **Wet Lab**: Common protein synthesis/purification protocols, Analytical Chem., BL1/BL2 Safety
- **General**: Technical Writing, LaTeX, Markdown, Linux, Data Viz, Research Communication

&c.

- Carnegie Hall choral singer. Track-certified motorcycle racer. Violinist. Studied music theory part-time at IRCAM&UVA. Interests span drug discovery, classical ballet, condensed matter physics, graph neural networks, photography, and T.S. Eliot's poetry. Speaks/reads basic Chinese.