Jack D. Carson

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Education

Massachusetts Institute of Technology   *Cambridge, Massachusetts*
Bachelor of Science   *September 2024 -*
Anticipated Physics and Philosophy Double Major (Course 8 & 24-1)

University of Tulsa   *Tulsa, Oklahoma*
Concurrent Enrollment   *March 2022 - June 2024*
GPA: 4.0/4.0
Relevant Coursework: Linear Algebra, Discrete Math, Probability Theory, Physics II, Modern Physics, Data Structures II

Booker T. Washington High School   *Tulsa, Oklahoma*
High School Diploma   *August 2020 - June 2024*
GPA: W: 4.78/5.0; UW: 4.0/4.0; Class Rank: 1/292
Relevant Coursework: Multivariable Calculus, Advanced Math Techniques, Research Statistics

Policy Experience

MIT Schwartzman College of Computing   *October 2024 -*
Social and Ethical Responsibilities of Computing Fellow   *Cambridge, Massachusetts*

- 1/5 freshmen selected from ~ 500 applications for SERC research fellowship.
- Working under Dr. Amir Reisizadeh on the interpretability of generative models.

United Nations Summit of the Future   *September 2024*
Delegate   *New York, New York*

- Represented university in negotiating and adopting a "Pact for the Future," focusing on key areas like sustainable development, international peace, technology cooperation, and youth engagement.
- Worked on strengthening global governance, align international institutions with current challenges, and push forward efforts to achieve the Sustainable Development Goals.

Americans for Responsible Innovation   *May 2024 -*
Policy Analyst   *Cambridge, Massachusetts*

- Researched academic literature on AI governance, and AI policy conversations in government.
- Organized two events (London and Washington, D.C.) with Chatham House to address geopolitical concerns about artificial intelligence.
- Researched and edited book-length manuscript on national artificial intelligence policy.

Research Experience

MIT McGovern Institute for Brain Research   *August 2023 -*
Research Assistant   *Cambridge, Massachusetts (Hybrid)*

- Only high school student in history of Jasanoff lab offered paid research extension.
- Working with both *in vivo* experiments involving rodent fMRI and dry lab modelling.
- Currently working on using deep generative modelling for robust fMRI denoising.
- Developed skills in wet lab biochemistry, scientific signal processesing, high performance computing, and DNA engineering.

CEE/MIT Research Science Institute   *June 2023 - September 2023*
Research Intern   *Cambridge, Massachusetts*

- Selected for Research Science Institute at MIT, the most prestigious international high school research honor ($< 2\%$ acceptance).
- Worked under Prof. Alan Jasanoff (PI) and Dr. Kevin Chung at MIT Biological Engineering.
- Developed mathematical model and software to generalize neurofeedback methods to large neuron groups, using autoencoder latent-space embeddings.
- Wrote paper *A Feature-Generalizable Technique for Neural Conditioning.*

University of Tulsa Vehicle Autonomy and Intelligence Lab   *Aug 2022 - May 2023*
Compression Systems Researcher   *Tulsa, Oklahoma*

- Paid Systems Developer and Researcher under NASA/FAA Grant (7-15 hours per week).
- Core member of OpenGCAS project; led OpenRQS project.
- Only high school student in organization.
- Wrote paper *Geospatial Compression Through Entropy-based Quadtree Raster Decomposition* invited for Digital Avionics Systems Conference 2024 in Barcelona.

University of Tulsa LeBlanc Lab   *May 2022 - Sep 2022, April 2023 - June 2023*
Research Assistant   *Tulsa, Oklahoma*

- Presented ML project *Photoanalysis of Electrochemically Deposited Thin Films for Photovoltaics Applications* at OKPVRI Conference.
- Wrote paper *Underfitting Heuristic Segmentation Models for Superior Neural Results.*
- Youngest author named in journal paper *Maintaining Electrochemical Performance of ITO-PET Electrodes under High Strain* published in *American Chemical Society Omega.*

Selected Honors

White House Presidential Scholar
June 2024
Named by President Joe Biden as one of 161 outstanding seniors from across the US.

3rd Place, MIT Brain Computer Interface Competition
February 2024
Won $3,000 award from MIT Sandbox and BCI Initiative. Developed system to control robotic vehicle through EEG signals. Youngest participant in competition.

Center for Excellence in Education "STEM Spotlight" Featured Student of the Year
November 2023
After attending Research Science Institute, featured in annual CEE newsletter, highlighting research contributions and outreach efforts in Oklahoma.

2nd Place Undergraduate Research, Oklahoma Photovoltaics Research Institute
February 2023
Original chemistry research in LeBlanc lab awarded by OK Photovoltaics Research Institute at regional research conference for University of Tulsa, University of Oklahoma, Oklahoma State University, University of Arkansas, and Northeastern State University. Only high school student to submit research.

Honoree, Oklahoma Indian Honor Society
June 2022, June 2023, June 2024
Chosen as top Native American student in state of Oklahoma for three consecutive years. Received Cobell Scholarship for Native American Students; Aristocrat Scholarship for Native Students; Accenture Scholarship for Native American Students; and Indigenous Peoples Education Fund Scholarship for use at MIT.

Technical skills

Programming Skills	ML/AI, Image Processing, Systems Programming, Algorithm Design, Linux, High Performance Computing
Programming Languages/Tech	C, C++, Rust, Python, TypeScript, JavaScript, Java, Julia, Mathematica, SQL, LaTeX, PyTorch, Next.js/React
Assorted	Technical Writing, Lab Training (BL 3), Scientific Visualization, Public Speaking

Publications

Carson, J. D. (2023) *The JDVC Multivariable Calculus Cookbook.* Self-Published (ISBN: 979-8218114107). Retrieved from https://www.amazon.com/Multivariable-Calculus-Cookbook-Step-Step/dp/B0C6BFB7KK

Waldman, L. J., Haunert, D. P., **Carson, J. D.**, Weiskopf, N., Waldman, J. V., & LeBlanc, G. (2024). Maintaining electrochemical performance of flexible ITO-PET electrodes under high strain. ACS Omega, 9(27), 29732–29738. https://doi.org/10.1021/acsomega.4c03288

Independent Projects

A Feature-Generalizable Technique for Neural Conditioning	View. Presented at RSI Symposium.
A Novel Set Partition Coding Algorithm for GeoTIFF Digital Elevation Models	View. Invited to DASC 2024
Underfitting Heuristic Segmentation Models for Superior Neural Results	View. Looking for CSAIL continuation.

Awards

Cobell Scholarship Recipient	MIT SERC Fellow
Air Force Engineering Excellence Award	1st Place, Tulsa Science and Engineering Fair
Finalist, International Science and Engineering Fair	Presenter: University of Tulsa Research Showcase
Varsity Letter: Football 2020 & 2021	Native American Academic Excellence Award
Oklahoma Academic All State	Presenter: AISES National Research Convention
AP Scholar with Distinction	CollegeBoard National Indigenous Recognition
National Merit Semifinalist	T.D. Williamson Engineering Innovation Award

&c.

Motorcycle Racing. Level II racetrack certified.
Boxing. Competitive boxing in Oklahoma and Massachusetts (2022 - present)
Trekking. Trekked throughout the western United States (Utah, Idaho, California, and New Mexico) and southern Africa (South Africa, Namibia, Botswana, Zambia, Malawi, Uganda, Rwanda, Tanzania, and Kenya).
Music composition and conducting. Trained in violin, viola, voice, and piano. Performed twice at Carnegie Hall and in a production of the Washington (D.C.) National Opera. Studied composition at *Institut de recherche et coordination acoustique/musique* (IRCAM) in Paris, France, and at Boulanger Institute, also in Paris. Studied conducting for two years under Timothy Henty.