Jack D. Carson

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Research experience

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

- Only high school (HS) student in history of Jasanoff lab offered paid research extension
- Working with both *in vivo* experiments involving rodent fMRI and dry lab modelling and development
- Currently working on using deep generative modelling for robust fMRI denoising

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

- Selected for Research Science Institute at MIT. Most prestigious intl. HS Research Honor. ($< 2\%$ Acceptance)
- Worked under Dr. Alan Jasanoff (PI) and 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 Hrs per Week)
- Core member of OpenGCAS project; Led OpenRQS project
- Worked alongside researchers at Stanford, CERN, NASA
- Only HS student in organization
- Wrote paper *Geospatial Compression Through Entropy-based Quadtree Raster Decomposition*, invited for Digital Avionics System Conference 2024 in Barcelona

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

- Only HS student part of CSURP Research Program
- Only HS student selected for UTulsa Research Showcase
- 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.*
- Awaiting coauthor naming on journal paper

Education

University of Tulsa *Tulsa, Oklahoma*
Concurrent Enrollment *March 2022 -*
Current GPA: 4.0/4.0
Relevant Coursework: Linear Algebra (2022), Discrete Math (2023), will take Probability Theory, Modern Physics, Data Structures II (2024)

Booker T. Washington High School *Tulsa, Oklahoma*
High School Diploma *March 2022 -*
Current GPA: W: 4.74/5.0; UW: 4.0/4.0; Class Rank: 1/300

Thomas Jefferson High School for Science and Technology *Alexandria, Virginia*
High School Diploma *June 2021 - March 2022*
Relevant Coursework: Multivariable Calculus, Advanced Math Techniques, Research Statistics (2021)

Community

Cherokee Nation Tribal Youth Council *December 2022-*
Secretary
Selected as at-large representative for over 80,000 Cherokee youth living off-reservation in the Cherokee Nation. Worked to advance STEM education and cultural involvement among young tribal members.

Tulsa Native Youth Board *September 2022-*
President
President of Tulsa Native Youth Board, empowering Native youth to connect with leadership opportunities, cultural heritage, and opportunities to improve Indigenous communities.

Booker T. Washington Native American Alliance *August 2022-*
President
Founded and served as inaugural president of the Native American student association at Booker T. Washington High School, a large urban high school with a substantial Indigenous population.

City of Tulsa Youth City Council *February 2022-*
Councilor
Selected by Mayor of Tulsa to serve as an inaugural youth city councilor.

Technical skills

Programming Skills	ML/AI, Image Processing, Systems Programming, Algorithm Design, Linux, High Performance Computing, Test Driven Development
Programming Languages/Tech	C, C++, Rust, Python, TypeScript, JavaScript, Java, Julia, Mathematica, SQL, LaTeX, PyTorch, Next.js/React
Assorted	Technical Writing, Lab Training (up to Biohazard Level 3),

Publications

The JDVC Multivariable Calculus Cookbook	Amazon. Published book on Multivariable Calculus.
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 MIT CSAIL continuation.

Awards

Native American Academic Excellence Award 2022 & 2023
Oklahoma Indian Honor Society
Research Science Institute
Air Force Engineering Excellence Award
T.D. Williamson Engineering Innovation Award
Presenter: University of Tulsa Research Showcase
Varsity Letter: Football 2020 & 2021