Jake Sansom

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About Me

I am an aspiring computational cognitive scientist interested primarily in working and declarative memory. I currently do research in embodied AI, a field which I believe employs an empirical paradigm conducive for the study of cognition.

Skills

- **Languages:** C++, Python, MATLAB, Bash, Batch
- **Software Packages:** PyTorch, NLTK, Scikit-Learn, NumPy, SciPy, Git, Docker, OpenMP
- **Other:** DSP, FEA, CFD, Global Optimization

Education

The University of Michigan — Ann Arbor, MI
M.S. in Computer Science and Engineering, GPA: 4.00/4.00 — 2022–Current

- Fall 2022: Natural Language Processing (A), Randomness and Computation (A)
- Winter 2023: Computational Modeling of Cognition

The University of Texas at Austin — Austin, TX
B.S. in Computational Engineering, Certificate in Evidence and Inquiry, GPA: 3.68/4.00 — 2016–2020

- Thesis: "Cognitive Processes: A Whiteheadian Perspective"
- Major Coursework: Probability, Stochastic Processes, Software Engineering, Parallel Computing
- Certificate Coursework: Mathematical Neuroscience, Neural Systems I and II, Philosophy of Mind

Research Experience

Situated Language and Embodied Dialogue (SLED) Lab — Ann Arbor, MI
Research Done for Course Credit — 2022

- Studying grounded language acquisition in embodied AI agents for applications in robotics

Willerson Center for Cardiovascular Modeling and Simulation — Austin, TX
Research Assistant — 2018–2020

- Co-developed FM-Track, an open-source Python package that processes 3D microscope imagery
- Helped create a hierarchical model of AVIC activation, a phenomenon that frequently causes valve diseases
  - Simulated novel experimental procedures using computational techniques such as ML and FEA
  - Used empirical data to develop models of cell activation using the math of continuum mechanics

Henkelman Research Group — Austin, TX
Research Assistant — 2017

- Doubled the efficiency of a Python algorithm used for high-dimensional, non-convex global optimization

Publications

[1] E. Lejeune, A. Khang, **J. Sansom**, and M. Sacks, "FM-Track: A Fiducial Marker Tracking Software for Studying Cell Mechanics in a Three-Dimensional Environment", in *SoftwareX 11*, 2020, p. 100 417.

[2] A. Khang, A. Rodriguez, M. Schroeder, **J. Sansom**, E. Lejeune, and M. Sacks, "Quantifying Heart Valve Interstitial Cell Contractile State Using Highly Tunable Poly(Ethylene Glycol) Hydrogels", in *Acta Biomaterialia 96*, 2019, pp. 354–367.

Industry Experience

Northrop Grumman San Diego, CA

Systems Engineer (Technical Level II), Pathways Rotational Training Program 2020–2022

- Leveraged my expertise in the HW-, SW-, and algorithm-level architecture of a fielded, software-defined radio to:
  - Assist a cross-organizational team with the design and deployment of a novel DSP algorithm
  - Author and obtain customer funding for a proposal detailing improvements to a fielded DSP algorithm
- Created the AI Corporate Catalog, a company-wide database of AI/ML capabilities
- Led a small team in the design and deployment of a C++ unit testing infrastructure

Ansys Government Initiatives (formerly Analytical Graphics Inc.) Exton, PA

Corporate Systems Engineering Intern Summer 2019

- Used Python to quantify the accuracy of orbital decay forecasts in STK, AGI's primary software offering
- Helped develop multiple simulations that modeled orbital dynamics, communications links, and terrain effects
- Outlined a strategy to bolster STK's collaborative capabilities and presented it to the senior development team

Presentations

- X. Feng, A. Khang, **J. Sansom**, N. West, D. Ilitzky, N. Aufiero, E. Lejeune, and M. Sacks, "A Simulationof Heart Valve Interstitial Cell Contractile Behavior in 3D Gels", presented at the BMES 2020 Virtual Annual Meeting, Oct. 2020.
- A. Khang, E. Lejeune, **J. Sansom**, N. West, and M. Sacks, "Quantifying the 3D Mechanical Tractions of the Aortic Heart Valve Interstitial Cell", presented at the BMES 2019 Virtual Annual Meeting, Oct. 2019.
- **Sansom, J.** "Investigating Methodology for Global Optimization." Poster session presented at the Undergraduate Research Forum at UT Austin. April 13th, 2018; Austin, TX.

Scholarships and Awards

- Northrop Grumman BRAVO to our Stars 2021–2022
  Awarded on occasion to high-performing employees. Won once for operational efficiency and twice for performance
- FSTI Award for Excellence in Chemistry 2018
  One of ~20 awards given at the 2018 Undergraduate Research Forum at UT Austin, which had ~350 participants
- Engineering Honors Scholarship 2016–2020
  Undergraduate honors program and scholarship awarded to roughly 10% of the UT Austin engineering class
- Polymathic Scholars Interdisciplinary Humanities and Natural Science Honors 2016–2020
  Multidisciplinary thesis program that allows students to design their own certificate

Extracurricular Activities

- Chair of Northrop Grumman Pathways Professional Development Committee 2021–2022
  Planned and successfully launched a new technical mentorship program for early-career engineers
- Volunteer at the Arc and the Rosedale School 2018–2019
  Helped adults and children with cognitive disabilities develop life skills and provided constant positive feedback
- Undergraduate Representative for the Society for Industrial and Applied Mathematics 2018–2019
  Worked with leaders to offer membership and resources to the new undergraduate computational sciences program
- Eagle Scout and Troop Guide in the Boy Scouts of America 2016
  Led a team of 30 to construct shelves for a homeless shelter. Taught younger scouts various scouting skills