IAN L. JACKSON

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I am a second-year PhD student in Cognitive Science at UC San Diego. My research interests lie in the intersection between cognitive neuroscience and brain-computer interfaces. My training primarily spans the fields of computer science, machine learning, and neuroscience.

EDUCATION

PhD University of California - San Diego, Cognitive Science — Jun 2028

MS Duke University, Electrical & Computer Engineering — May 2023
Project: "Video Games for the Brain: Leveraging Unreal Engine for Neuroscience"

BA Reed College, Computer Science & Psychology — Jan 2021
Thesis: "Classification of 3D Shape Imagery Using a Brain-Computer Interface"

FELLOWSHIPS, GRANTS, AND AWARDS

Social Sciences Research Grant (UCSD) 2024
Received internal grant for MEG experiments in reconstructing visual stimuli using generative diffusion models

Excellence Award (JHU Applied Physics Lab CIRCUIT Program) 2023
Mentorship award for teaching fellowship in undergraduate summer program

REDD Intern Innovation Challenge Award (JHU Applied Physics Lab) 2023
1st Judge's Choice, 1st People's Choice for artificial blood substitute proposal in annual innovation competition team

GEM PhD Engineering & Science Fellowship 2023
National fellowship supporting five years of PhD study

CLBR Career Advancement Fund 2020
Travel and board funding for fabrication project at the University of Oregon

Reed Summer Opportunity Subsidy 2019
University-sponsored support fund for unpaid summer internship

SPUR Program Presentation Travel Aid 2018
Travel and board funding for presentation at SACNAS conference

Reed Winter Job Shadow Award 2017
University-sponsored internship experience at Portland Buddhist priory

RESEARCH EXPERIENCE

University of California San Diego, La Jolla, CA 2023-Present
Graduate Student (Cognitive Science Dept.)

- Designed autonomous behavioral repertoires and testing suites for in-lab robot used in rodent social neuroscience research (Python)
- Simulated autonomous behavior controlled by rat neural activity in CA2 (hippocampus), olfactory bulb, amygdala via Python (kivy)-based agent simulator
- Performed analyses of rat and robot positional interaction data using Gaussian Mixture Model
- Developed pipeline for aligning electroencephalography data from naturalistic scene viewing with CLIP-based latent embeddings for image reconstruction from brain data via stable diffusion
- Taught discussion sections, held office hours, graded exams, and provided administrative support as a teaching assistant for undergraduate courses

Johns Hopkins University Applied Physics Laboratory, Laurel, MD 2023-2024
ML/AI Intern

- ROS development for UAV utilizing PyTorch for in-flight image classification
- Continued development of testing framework for evaluating black-box autonomous systems by analyzing failure rate within system state space (Python)
- Continued development of Slack-based autonomous message service bot (Python)
- Lead courses, workshops, and individual tutoring sessions with undergraduate students to teach skills in programming, data science, and machine learning

Cogan Lab, Duke Institute for Brain Sciences, Durham, NC 2022-2023
Master's Student Researcher, Advisor: Dr. Gregory Cogan

- Unreal Engine audio/visual stimulus delivery optimization for neuroscience research
- Performed data acquisition using custom Unreal Engine script (C++)
- Performed data analysis using MATLAB script to process audio/visual signals
- Master's project final product available via GitHub: SimonForNeuro

Teledyne Intelligent Systems Laboratory, Durham, NC 2022
Research Engineering Intern

- Designed, implemented, and tested novel SSVEP task in Unreal Engine for MEG/EEG experiments
- Performed spectral analysis of EEG data (MATLAB, Python)
- Classification of EEG/MEG data using Support Vector Machine (Python)
- Performed analysis of eye behaviors in nonhuman primate experiments using saccade detection algorithms (MATLAB)
- Built Unreal Engine plugins for COM port I/O, timestamps, virtual reality (C/C++)
- Quality and functional testing of novel PCBs for sensing and stimulation of neural activity in a custom brain-computer interface (MATLAB)
- Collaborated with a large team on contract research projects

Institute of NeuroInnovation, Santa Monica, CA 2021
R&D Lead

- Developed signal processing pipeline for EEG and ECG data (power spectral density, spectral connectivity, scalp topography, heart rate variability) in Python
- Planned and conducted experiments to validate signal processing pipeline
- Designed a novel metric for mental health – the *NBSi* – based on several biosignals
- Established R&D department for studying innovative wellness interventions using EEG/ECG

Reed College, Portland, OR 2020
Senior Thesis Researcher, Advisors: Michael Pitts & Eitan Frachtenberg

- MATLAB scripting for processing EEG data and extracting features using Independent Component Analysis
- Python scripting for cross-validated classification of mental imagery from EEG data using Linear Discriminant Analysis
- Generated novel hypothesis, designed methods, collected and analyzed data, wrote and defended thesis under supervision of interdisciplinary team
- Established interdisciplinary department in Computer Science & Psychology

University of Oregon, Institute of Neuroscience, Eugene, OR 2020
Microfabrication Lab Volunteer

- Wrote successful grant to fund intensive experience with working on micron-scale 3D printer under supervision of Tim Gardner (Co-founder, Neuralink)
- Initiated development of Python script for movement of piezo motor to improve speed of two-photon lithography

Oregon Health & Science University (OHSU), Portland, OR 2019
Software Development Intern

- Collaborated with a small team to further develop Python-based brain-computer interface speller software, BciPy, and test during in-home sessions with patients
- Unit tested code, designed new module for integration into existing software, handled large datasets, and employed signal processing techniques

University of Oregon, Institute of Neuroscience, Eugene, OR 2018
Undergraduate Research Intern

- Wrote computer vision package (Python) to track mice for behavioral experiments
- Extended package to acquire and analyze temperature data via a thermistor

SCALP Lab, Portland, OR 2017-2018
Undergraduate Lab Assistant

- Aided thesis students with EEG experiments
- Attended discussions on and provided feedback for ongoing and future experiments
- Presented ideas for future projects

ACADEMIC PUBLICATIONS

Jackson, I.L., Classification of 3D Shape Imagery Using a Brain-Computer Interface, Portland, OR: Reed College Library, 2021. [PDF]

PRESENTATIONS

Art Installation, "Telepathic Polluck: A Brain-Computer Interface for Art Generation," Duke University Art of a Scientist Exhibition, Jul-Aug 2023. *In collaboration with Union College Neurotechnology.*

Research Showcase Presentation, Teledyne Intelligent Systems Lab Annual Intern Presentation Showcase, Aug 2022.

Keynote Address, "INI Data Analysis Software for EEG/ECG Data," Institute of NeuroInnovation Quarterly Board Meeting, Jun 2021.

Poster Presentation, "What's in a Smell? How Darcin Modulates Social Behavior in Mice," SACNAS, Diversity in STEM Conference, Oct 2018.

PROFESSIONAL AFFILIATIONS

National Society of Black Engineers
Duke University Chapter, 2022-2023
UC San Diego Chapter, 2024-Present

National GEM Consortium
GEM Fellow, 2023-Present

MENTORSHIP AND SERVICE

Cognitive Science Department (UCSD)
Social Events Co-Chair, La Jolla, CA, 2024-Present

Colors of the Brain (UCSD)
Graduate Student Mentor, La Jolla, CA, 2023-Present

Triton Neurotechnology (UCSD)
Graduate Student Mentor, La Jolla, CA, 2023-2024

GAMAE, International
Content Editor & Creator (Family Organization), Chapel Hill, NC, 2011-2022

Free Geek Electronics Recycling Center
Volunteer, Portland, OR, Jun-Sept 2017

COMPUTATIONAL SKILLS

Programming Languages: Python, C/C++, MATLAB, Bash, Java, MIPS Assembly

Major Software/Packages: PyTorch (machine learning), Scikit-Learn (machine learning), Robot Operating System (ROS), Brian2 (neural modeling), EEGLAB (EEG analysis), BrainVision Analyzer (EEG analysis), Unreal Engine (video game design), Altium Designer (schematic and PCB design), Autodesk Fusion (computer-aided design), KiCAD (schematic and PCB design), Ansys Fluent (computational fluid dynamics), Docker (OS virtualization)

Operating Systems: Linux, Windows, MacOS

LANGUAGES

English: Native Language

Spanish: Advanced Reading, Writing, Speaking, and Listening