

Alex Gonzalez, Ph.D.

alx.gnz@gmail.com | [Website: alexgonzl.github.io](https://alexgonzl.github.io) | [GitHub: alexgonzl](https://github.com/alexgonzl) | [LinkedIn](#) | [Stanford Profile](#)

Research engineer and computational physiologist focused on rigorous inference from noisy biological data, working at the intersection of domain science and frontier AI.

Technical Skills

- **Statistical Modeling & Inference:** Panel-data and mixed-effects modeling on longitudinal biomedical data; causal inference via natural experiments, g-computation, and double-robust ML; multivariate imputation for missing physiological data.
- **Machine Learning:** Supervised and unsupervised learning for biological data; architecture design and custom loss functions; encoder models for ML-driven hypothesis testing.
- **Signals & Time Series:** Multi-modal biomedical signals (EEG/ECoG/fMRI, ECG, wearables); filter design, adaptive filtering, multi-band decomposition; closed-loop real-time experimental systems (thesis: closed-loop tACS); forecasting and state-space models on irregular longitudinal data; real-time event detection in FDA-regulated medical devices.
- **Domain Expertise:** Memory and navigation circuits across human (ECoG, EEG/fMRI) and rodent (single-unit, population-level) systems; longitudinal human physiology at cohort scale (wearable biometrics under real-world conditions); experimental design for large-scale multimodal human subjects' studies.
- **Agentic Coding:** AI-assisted codebases across research and engineering; designed ADR-governed modeling repos with codified assumption-surfacing rules, milestone plans, and subagent hierarchies for parallel scientific-review perspectives.
- **Programming:** Python (PyTorch, scikit-learn, statsmodels, scipy, pandas, matplotlib, ipywidgets), R.

Professional Experience

Scientific Project Manager | Wu Tsai Human Performance Alliance, Stanford *Feb 2023 – Present*

- Menstrual cycle × wearables: established a cohort-scale normative profile of physiological biometrics across the adult lifespan; identified sleep patterns predictive of cycle variability; designed natural experiments using sleep variation for causal-inference on physiological biometrics. (npj Digital Medicine, 2026) [[code](#)] [[website](#)].
- Designing individual-level models of runner training adaptation for performance forecasting and injury-risk inference, using longitudinal wearable + training data. Causal state-space modeling for running physiological adaptations [[code](#)].
- Methodological resource on cross-Wu Tsai biomechanics projects: mixed-effects modeling of hamstring muscle-tendon lengthening across running conditions; hierarchical bootstrap for unbalanced force-measure comparisons.
- Run \$1M annual funding competition, reviewing hundreds of cross-disciplinary proposals spanning molecular to translational scales.

Postdoctoral Scholar | Neurobiology Department, Stanford University *April 2017 – 2023*

- Proposed and implemented encoder-model hypothesis testing to probe how parahippocampal circuits represent navigational information; showed that rate remapping strength predicts goal-directed navigation performance, and built a continuous evidence accumulation decoder for trial-by-trial behavior from population activity (eLife, 2024).
- NeuroRoots: prototyped the implant harness and performed live-animal surgical implantations for this novel BMI (AIP Advances, 2024).
- Related translational commentary on reinforcement learning frameworks bridging rodent and human neuroscience (Lab Animal, 2022).
- Served as the lab's resource for signal processing and statistics, authoring methods tutorials used by lab members.

Signal Processing & Algorithms Consultant | Element Science *June – Dec 2014*

- Integrated arrhythmia domain knowledge into a multi-band signal processing pipeline for real-time cardiac event detection in a wearable defibrillator (FDA-regulated medical device); achieved then-state-of-the-art true-positive rates on validated datasets (details proprietary).

PhD Researcher | Electrical Engineering Department, Stanford University *Sept 2010 – April 2017*

- PhD thesis, Cortical Electrophysiology of Human Episodic Memory (advisor: A. Wagner): designed a closed-loop transcranial alternating current stimulation paradigm combined with direct cortical recordings to establish a causal role for theta-phase alignment in memory formation.
- Large-scale human subject studies (N>200) across EEG, ECoG, fMRI, and transcranial electrical stimulation.
- Decoding of temporal dynamics of human episodic memory from ECoG (PNAS, 2015). Spatio-temporal adaptive filtering for EEG-fMRI (SfN 2014) [[code](#)].

Early Experience (Pre-PhD)

Control & Data Systems Intern, NASA Kennedy Space Center (Jan–May 2009); **Mathematical Modeling Intern**, Boeing Phantom Works (Jun–Aug 2008).

Education

Ph.D. Electrical Engineering · Stanford University	2010 – 2017
M.Sc. Electrical Engineering · Stanford University	2010 – 2013
B.Sc. Electrical Engineering · University of Puerto Rico – Mayaguez	2005 – 2010

Honors & Fellowships

- NIH Ruth L. Kirschstein National Research Service Award (NRSA F32), 2019–2022
- Stanford DARE Fellowship (Diversifying Academia, Recruiting Excellence), 2015–2016
- NIH Biotechnology Training Grant, 2012–2015
- Alfred P. Sloan PhD Graduate Fellowship, 2011–2013
- NSF Graduate Research Fellowship, 2010–2013

Teaching & Mentoring

- Leadership at Neuromatch Academy: Chief Diversity Officer (2021), Ombuds team for conflict resolution (2021–2023); mentored dozens of students, Neuromatch student group presented work at EMBC. DIBEJ committee, Wu Tsai Neurosciences Institute (2020–2022).
- Head TA, DSP (Stanford, Prof. Schafer, 2015–2016) and Instructor (2015); TA, Python Workshop and Computational Neuroscience (Stanford SRP 2021, Neuromatch 2020). Peer reviewer for Cerebral Cortex and Journal of Neuroscience.

Selected Presentations

World Congress of Biomechanics (WCB, 2026); Female Athlete Conference (2025); EMBC (2021); Society for Neuroscience (SfN, 5×); Cosyne (2022).

Publications

Preprints / In Review:

T. Fisher, M. Sosa, A. Gonzalez, X. Cheng, L. Giocomo. Structured navigation in a goal-directed task reveals flexible spatial coding. Under review.

A.M. Xue, et al. Hippocampal patterns and associative memory: Distinct intracranial EEG temporal encoding patterns support memory. bioRxiv, 2026.

Peer-Reviewed:

A. Gonzalez, J.J. O'Day, S.C. Johnson, J. Kim, S. Jasinski, K. Holmes, S.L. Delp, J.L. Hicks. The menstrual cycle through the lens of a wearable device: insights into physiology, sleep, and cycle variability. npj Digital Medicine, 2026. [[doi](#)] [[code](#)] [[website](#)]

A. Gonzalez, L. Giocomo. Parahippocampal neurons encode task-relevant information for goal-directed navigation. eLife, 2024. [[code](#), [control code](#)]

M.D. Ferro, C.M. Proctor, A. Gonzalez, et al. NeuroRoots, a bio-inspired seamless brain-machine interface for long-term recording in delicate brain regions. AIP Advances, 2024.

A. Gonzalez, L. Giocomo. From Rats to Humans: how novel behavioral paradigms and reinforcement learning can bridge the gap in translation. Lab Animal, 2022.

B.M. 't Hart, et al. Neuromatch Academy: a 3-week, online summer school in computational neuroscience. Journal of Open Source Education, 2022.

A. Gonzalez, et al. Electrocorticography reveals the temporal dynamics of posterior parietal cortical activity during recognition memory decisions. PNAS, 2015. [[code](#)].

F.A. Mujica, W.J. Esposito, A. Gonzalez, et al. Teaching Digital Signal Processing with Stanford's Lab-in-a-Box. IEEE SP/SPE, 2015.

C.S. Simmons, J.Y. Sim, P. Baechtold, A. Gonzalez, et al. Integrated strain array for cellular mechanobiology studies. J. Micromech. Microeng., 2011.