Megan E. McDonnell

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Objective: Neural engineer with 4+ years of experience, looking for a position in research and development environments, where I can apply my skills in statistical modeling and algorithm design for neural decoding.

Education

Ph.D. — ***Neural Computation*** Aug 2021 - Present
Advisors: Byron Yu, Matthew Smith, Steven Chase GPA: 3.96
Carnegie Mellon University, Pittsburgh, PA

Bachelor of Science — ***Biomedical Engineering*** Aug 2017 - Dec 2020
Minor, Computer Science: Computing and People GPA: 3.97
Georgia Institute of Technology, Atlanta, GA

Work and research experience

Carnegie Mellon University — ***Graduate Research Assistant*** Aug 2021 - Present
Advisors: Dr. Byron Yu, Dr. Matthew Smith, and Dr. Steven Chase
Goal: Understanding encoding of cognitive variables across the brain using statistical and machine learning methods.

- Co-leading multiple threads investigating how cognitive variables such as motivation and physiological arousal are encoded in high-dimensional neural activity as well as systemic signals like pupil size, heart rate, and respiration.
- Lead development and validation of a novel machine learning approach for modeling neural covariability in two populations, available on GitHub.
- Developed algorithms and novel decoders for neural activity to be implemented in real-time control systems. Designed and performed experiments controlling a peripheral device with real-time neural activity.

Mayo Clinic — ***Science Fellow*** Jun 2020 - Nov 2021
Advisor: Dr. Alfredo Quiñones-Hinojosa

- Designed and prototyped a novel surgical simulation tool for brain mapping as part of an engineering capstone project, including implementation of electrical stimulation feedback to improve training procedures for neurosurgery.

Georgia Institute of Technology — ***Technician & Undergraduate Research Assistant*** Jan 2018 - July 2021
Advisor: Dr. Garrett Stanley

- Ran experiments and analysis to investigate behavioral adaptation in a sensory detection task. Built skills in multi-modal data recordings and analysis, fluorescence microscopy, technical writing.
- Prototyped hardware for experimental data recording setup, gaining experience in circuit building and testing.
- Developed experimental and histology protocols for identifying and quantifying neuronal projections in sensory cortex.

Publications & selected presentations

- **M. E. McDonnell**, A. Umakantha, R. C. Williamson, *et al.*, "Interactions across hemispheres in prefrontal cortex reflect global cognitive processing," *bioRxiv*, Jun. 2025. DOI: 10.1101/2025.06.12.659406
- C. Waiblinger, **M. E. McDonnell**, A. R. Reedy, *et al.*, "Emerging experience-dependent dynamics in primary somatosensory cortex reflect behavioral adaptation," *Nature Communications*, Dec. 2022. DOI: 10.1038/s41467-022-28193-z
- **M. McDonnell**, F. Colaguori, M. Marin-Mera, *et al.*, "Three-Dimensionally Printed Surgical Simulation Tool for Brain Mapping Training and Preoperative Planning," *Operative Neurosurgery*, Dec. 2021. DOI: 10.1093/ons/opab331
- **M. E. McDonnell**, A. N. Chandrasekaran, C. Ki, *et al.*, *Distinct sensory and motor components of choking under pressure*, Talk, Gordon Research Conference, Jul. 2024
- A. N. Chandrasekaran, **M. E. McDonnell**, C. Ki, *et al.*, *Reward and difficulty drive distinct changes in behavior and motor cortical activity*, Poster, Cosyne, Feb. 2024
- A. Umakantha, R. C. Williamson, **M. E. McDonnell**, *et al.*, *Coordinated variability in prefrontal cortex reflects global and local neural processing*, Poster, Society for Neuroscience, Nov. 2022
- **M. McDonnell**, F. Colaguori, M. Marin-Mera, *et al.*, "Systems and methods for a simulator for brain mapping," pat. 17 524 496. [Online]. Available: https://patentcenter.uspto.gov/applications/17524496

Relevant skills

Programming: Python, PyTorch, MATLAB
Technical: LaTeX, Git, neural signal processing, machine learning, reinforcement learning, statistical modeling