Megan deBettencourt

Menlo Park, CA megan.debettencourt@gmail.com
https://debetten.github.io Megan-deBettencourt debetten

About Me

I'm a scientist and researcher with a background in neuroscience, focused on developing technologies that translate insights from cognition and physiology into real-world impact. My expertise spans experimental design, data analysis, and machine learning, including deep experience in physiological signal processing, brain-computer interfaces, behavioral modeling (both quantitative and qualitative), and statistics. I've led interdisciplinary projects in academic, clinical, and industry settings, to build adaptive systems that respond to and support human behavior in real time. At the intersection of science and engineering, I explore how innovative technologies can meaningfully enhance human experience.

Education

Princeton University, Princeton Neuroscience Institute
PhD, Neuroscience — Sept. 2016
MA, Neuroscience — Aug. 2012

Columbia University, School of Engineering and Applied Science
BS, Applied Mathematics *magna cum laude* — May 2010

Experience

Ruby Neuroetch, Senior Research Scientist — Redwood City, CA
Early-stage startup delivering AI-powered mental health solutions integrating real-time neurophysiology (fNIRS, EEG, gaze tracking, pupillometry) for personalized, scalable interventions
Feb. 2023 – Present
2 years 3 months
full-time

- Led end-to-end development of a digital mental health product, integrating real-time physiology, AI, and neurotechnology into adaptive, closed-loop interventions
- Identified key PTSD treatment biomarker through multimodal data analysis (qualitative electronic diaries + time-series eye and PPG signals), using ML and statistical modeling
- Fine-tuned deep learning models for object segmentation and real-time facial landmark tracking using camera recordings
- Developed LLM-based grading system to automatically rate human-AI conversations, achieving human-level accuracy and significantly increasing operational throughput
- Created full-stack web platform with AI-driven chat interface for scalable experiments, enhancing research scalability and interactivity
- Supervised multimodal data collection from 200+ users for psychological research study, ensuring high-quality, accurate data collection
- **Skills:** Python (scikit-learn, statsmodels, PyTorch, OpenCV), JavaScript (Node.js, React), LLMs (OpenAI API, LangChain, Prompt engineering), Version control (git)

Stanford University, Wu Tsai Human Performance Alliance, Consultant — Palo Alto, CA
Enhancing cognitive performance through closed-loop pupillometry
2023 – 2024
Ad-hoc, as needed

- Advised on experimental design and data analysis for closed-loop pupillometry system to monitor attention and improve human memory retrieval
- Developed and delivered functional code for real-time pupil tracking of attention lapses
- Mentored researchers in data interpretation and scientific communication
- **Skills:** Python, Eye-tracking, Experiment design, Data visualization, Statistics

University of Chicago, Institute for Mind and Biology, Post-doctoral fellow (K99 & F32) — Chicago, IL
Oct. 2016 – Jan. 2023

- Designed closed-loop brain-computer interfaces that integrated EEG, pupillometry, and behavioral data to detect attention lapses in real time and trigger targeted interventions
- Combined image memorability (from fine-tuned deep learning computer vision models)

and attention fluctuations (from behavior) to develop neuroadaptive memory interfaces
- Developed hardware and software for collecting and analyzing attention and memory neural dynamics, working directly with clinicians and patients in neurosurgical operating suites and epilepsy patients during inpatient monitoring
- Presented findings to academic and industry stakeholders, authored peer-reviewed publications, secured NIH funding, and mentored 10+ early-career researchers
- **Skills:** Python (ML classification and regression, scikit-learn, statsmodels), R, MatLab, Experimental design & data collection (psychopy, MTurk, prolific), Scientific & grant writing

Princeton University, Princeton Neuroscience Institute, PhD student (NSF GRFP) — Princeton, NJ — Sept. 2010 – Sept. 2016

- Launched academic-industry partnership with **Intel Labs** (Brain-Inspired Computing Lab), to build cloud fMRI analysis platform, pioneering new applications of AI in neuroimaging
- Led the end-to-end development of real-time fMRI brain-computer interfaces to detect and train visual attention states using multivariate pattern analysis, enabling adaptive cognitive neurofeedback; results led to 4 publications with 500+ citations
- Pioneered closed-loop neurofeedback systems capable of modulating and training attention in real time, laying groundwork for novel cognitive enhancement technologies
- Spearheaded clinical research collaborations with UT Austin and UPenn to translate research into applications for individuals with depression and anxiety
- **Skills:** BCIs, Neurofeedback, Data collection & analysis (Python & Matlab), Neuroimaging (fMRI), Cognition, Translational research, Experimental design, Scientific & grant writing

Columbia University, Biomedical & Electrical Engineering Depts., Undergraduate Researcher — New York, NY — Aug. 2008 – Aug. 2010

- Developed signal processing tools and ML tools (SVMs) to decode single-trial EEG and fMRI data, for research in brain-computer interface technologies

Selected Publications

Over 1000 citations for over 20 publications, for a full list, see Google Scholar or Pubmed

- MT deBettencourt, JD Cohen, RF Lee, KA Norman, NB Turk-Browne (2015) Closed-loop training of attention with real-time brain imaging. ***Nature Neuroscience***
- MT deBettencourt, PA Keene, E Awh, EK Vogel (2019) Real-time triggering reveals concurrent lapses of attention and working memory. ***Nature Human Behaviour***
- PA Keene*, MT deBettencourt*, E Awh, EK Vogel (2022) Pupillometry signatures of sustained attention and working memory. ***Attention, Perception, & Psychophysics***

Scientific contributions & presentations

- **Invited Talks & Panels**: Invited speaker at Neuroethics and the Future of Reality (2023), Invited panelist for **NeurIPS 2022** ("All Things Attention"), plus 20+ invited academic and industry talks (CMU, Intel, Microsoft, UCSF, Stanford, etc.)
- **Conference Presentations**: 30+ conference talks and posters presented at U.S. and international venues
- **Grant Funding**: Awarded $1M+ in federal grants (NIH BRAIN K99/R00, NIMH F32 NRSA, NSF GRFP) for neurotechnologies
- **Peer Review**: Reviewer for NeurIPS workshop (Gaze Meets ML) & major journals (e.g., Nature Neuroscience & Neuron)

Languages

English native; **French** fluent

Hobbies

Pottery (wheel-thrown functional ceramics), trail running, NYTimes crossword puzzles, birding