Megan deBettencourt

Menlo Park, CA | megan.debettencourt@gmail.com | 703-851-5578 | https://debetten.github.io
Megan-deBettencourt | debetten

About Me

I am a scientist and researcher with over a decade of experience developing computationally sophisticated analyses to understand human behavior and physiology. I have led human research studies across academia and industry, collaborating with cross-functional teams to extract insights from complex, multimodal data and design scalable interventions. Key areas of my expertise include human cognition (attention, memory), real-time biosensing technologies, and closed-loop human-AI interaction. I am driven to build innovative tools that enhance human health, physiology, and performance.

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 Neurotech, Senior Research Scientist — Redwood City, CA
Early-stage startup developing AI-powered mental health solutions integrating real-time physiological sensing for personalized, scalable interventions, funded by Wellcome Leap — Feb. 2023 – Present

- Developed an AI-powered digital mental health platform for PTSD that reduced the frequency of traumatic memory intrusions by 50%
- Engineered LLM–based evaluation system derived from clinical rubrics to analyze human–AI conversations, achieved human-level accuracy and scalable deployment
- Discovered novel pupillometry biomarker that tracked cognitive engagement during Tetris gameplay and predicted intervention success via statistical modeling
- Analyzed eye gaze and heart rate synchronization during movie viewing to measure shared attention and emotional resonance across individuals
- Led full-stack development of a cloud-based platform (React, OpenAI API, Node, Websockets, REST) synchronized with real-time behavioral and physiological data streams
- Supervised on-site multimodal physiology data collection from 200+ subjects in human research study: gaze tracking, pupillometry, PPG, webcam face/pose via mediapipe
- **Skills:** Python (scikit-learn, statsmodels, opencv, numpy, pandas, scipy, pytorch), AI LLMs (OpenAI API, Prompt engineering, LangChain), Version control (git), Data visualization (seaborn, dashboards, Adobe, Canva), Web development

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

- Advised on experimental design and analysis for a real-time system to predict and improve memory retrieval from pupillometry and EEG
- Built and delivered functional, real-time forecasting code to detect attention lapses from pupil size dynamics, enabling closed-loop interventions
- **Skills:** Python, Experimental design, Data visualization, Statistics, Eye-tracking (Tobii, EyeLink), Brain-computer interfaces, Psychophysics & behavioral methods, Mentorship

University of Chicago, Postdoctoral Fellow (NIH BRAIN Initiative K99 & NIMH F32) — Chicago, IL
Oct. 2016 – Jan. 2023

- Analyzed multimodal biosensing data (EEG, pupillometry, EOG, behavior) using machine learning models and high-performance computing to classify brain states in real time

- Engineered personalized memory augmentation system by leveraging attention and image memorability, from fine-tuned deep neural network vision models
- 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 & regression, scikit-learn, statsmodels), R, MATLAB, EEG, High-performance cluster computing (SLURM), Eye-tracking (EyeLink), Experimental design, Psychophysics, Scientific & grant writing

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

- Analyzed high-dimensional multivariate patterns in whole-brain brain fMRI data (~100,000 voxels) to decode neural representations of attentional states
- Developed closed-loop fMRI neurofeedback to measure and train human visual attention
- Launched academic-industry partnership with **Intel Labs** (Brain-Inspired Computing Lab), to build cloud fMRI analysis platform, for new applications of AI in neuroimaging
- Spearheaded research collaborations with UT Austin and UPenn to translate research into applications for individuals with depression and anxiety
- **Skills:** Python, Machine learning (sklearn), High-performance cluster computing (SLURM, qsub), Matlab, Brain-computer interfaces, Neuroimaging (fMRI), Closed-loop neurofeedback, Human cognition, Scientific & grant writing

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

- Built signal processing and ML tools (libsvm) to decode single-trial EEG and fMRI data

Selected publications and presentations

Over 100 colloquia, talks and posters for academic and industry audiences (e.g., CMU, Intel, Microsoft, UCSF, Stanford)
Reviewer for top journals and conferences (including NeurIPS 2022 Gaze meets ML)
Over 1000 citations for presentations in top journals. For a full list of publications, see Google Scholar or Pubmed

- **MT deBettencourt**, S Sakthivel, EA Holmes, M Chevillet (submitted) AI-guided digital intervention with physiological monitoring reduces intrusive memories after experimental trauma. arXiv preprint
- Invited panelist for **NeurIPS 2022** workshop (All Things Attention)
- **MT deBettencourt**, PA Keene, E Awh, EK Vogel (2019) Real-time triggering reveals concurrent lapses of attention and working memory. ***Nature Human Behaviour*** Article | Pubmed | Github
- **MT deBettencourt**, JD Cohen, RF Lee, KA Norman, NB Turk-Browne (2015) Closed-loop training of attention with real-time brain imaging. ***Nature Neuroscience*** Article | Pubmed

Scientific grants and fellowships

Independently awarded multiple competitive federal research grants

- **National Institutes of Health BRAIN Initiative** (K99/R00 Advanced Postdoctoral Career Transition Award, $200k+ K99 (activated), $750k+ R00 (declined), 2022-23
- **National Institutes of Health** National Research Service Award Postdoctoral Fellowship (NRSA F32) $150k+, 2018-21
- **National Science Foundation** Graduate Research Fellowship, 2012-2015 $100k+

Languages

English native; **French** fluent