Megan deBettencourt

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Megan-deBettencourt | debetten

About Me

I am a scientist and researcher with over a decade of experience developing technologies and products that enhance human perception, cognition, and behavior. With deep expertise in experimental design, statistical modeling, and machine learning data analysis, I have a proven ability to translate rigorous scientific research into real-world applications, including novel AI and neurotechnology products. I have led cross-disciplinary projects from concept to deployment, combining skills across hardware, software, quantitative and qualitative data analysis, and cross-functional collaboration. I am passionate about creating and building cutting-edge technologies that meaningfully augment 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 physiological sensing 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 AI, biosensors, and neurotechnology to deliver real-time treatment
- Built an LLM-based behavioral data analysis system, achieving human-level accuracy and significantly increasing operational throughput
- Developed full-stack web application with AI-driven chat interface for experimental studies using OpenAI API, enhancing research scalability and interactivity
- Identified key PTSD treatment biomarker through multimodal data analysis (qualitative electronic diaries + time-series physiological signals), using ML and statistical modeling
- Supervised data collection from 200+ participants (gaze, pupil, heart rate, face landmarks) for psychological research study, ensuring high-quality, accurate data collection
- **Skills:** Python (PyTorch, scikit-learn, statsmodels, OpenCV), JavaScript (Node.js, React, jsPsych), AI Large Language Models (OpenAI API, LangChain), Version control (git), Data visualization (dashboards, Adobe, Canva), Experimental design, Biometric sensing

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 (Tobii, EyeLink), Mentorship, Data visualization, Statistics

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

- Created closed-loop brain-computer interfaces leveraging EEG, pupillometry, and behavior to predict attention lapses in real time and support more effective interventions
- 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 multiple peer-reviewed publications, and secured independent NIH funding (K99/R00, F32)
- Mentored 10 PhD, masters, and undergraduate researchers from concept development to data analysis and publication, fostering skill development and successful outcomes
- **Skills:** Python (ML classification and regression, scikit-learn, statsmodels), R, MatLab, EEG, Eye-tracking (EyeLink), Psychophysics, Experimental design & data collection (psychopy, psychtoolbox, 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 end-to-end development of neuroadaptive designs and brain-computer interfaces to train & improve human visual attention with closed-loop, real-time fMRI neurofeedback, leading to 4 publications with 500+ citations
- Spearheaded clinical reserach collaborations with UT Austin and UPenn to translate research into applications for individuals with depression and anxiety, including participant recruitment, study design, data collection and analysis, and dissemination
- **Skills:** Experimental design, BCIs, Data collection & analysis (Python & Matlab), Neuroimaging (fMRI), Human cognition, Translational research, 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**: Independently awarded $1M+ in competitive federal grants (NIH BRAIN Initiative K99/R00, NIMH F32 NRSA, NSF GRFP) supporting novel neurotechnology and cognitive science research
- **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