

Matthew Russell

WORK EXPERIENCE

BCI Researcher - Tufts HCI Lab & Microsoft Research 2023 - Present

Conducted research on the effects of Large Language Models on brain activity using fNIRS, funded by and in collaboration with Microsoft Research. Currently engaged in follow-up studies to further explore the effects of using AI tools on humans, particularly as measured in the brain.

BCI Researcher - Tufts HCI Lab 2017 - Present

Designed, implemented, and analyzed human subject studies using fNIRS and EEG. Key research areas include differentiation of human states of workload and cross-task physiological states with low-cost EEG, and next-generation fNIRS-based interfaces to leverage index and recall of brain states.

Lecturer/Teaching Assistant - Tufts University 2017 - Present

Taught Data Structures in C++ (Lecturer, Summers 2023 & 2020), and assisted in courses on Computer Graphics, Intro CS, Cybersecurity, and Concurrency.

Research and Teaching Assistant - Syracuse University 2015 - 2017

Developed research code for the Center for Autism Research in Electrophysiology (CARE) lab and taught programming fundamentals to PhD candidates.

Resident - Dai Bosatsu Zendo, Rinzai Zen Buddhist Monastery 2011 - 2015

Lived and worked at the monastery, and undertook varied responsibilities

- Hatha Yoga Instructor: Certified (200-hour) instructor; taught yoga daily.
- Meditation Teacher: Instructed beginners in Zen meditation techniques.
- Jikijitsu (Zendo Monitor): Managed the structured flow of daily activities during retreats; ensured disciplined execution of meditation sessions (zazen), walking meditation (kinhin), and structured silent meals (jihatsu).
- Jisha (Monastery Assistant): Managed daily operational tasks and led work teams to maintain zendo cleanliness.

Research/Teaching Assistant - Hamilton College 2008 - 2010

Worked as a TA in fall/spring semesters; conducted human-subject fNIRS research during 2009 summer

EDUCATION

MS Computer Science 2017 - 2020

Tufts University

BA Computer Science & English Literature 2007 - 2011

Hamilton College

Medford, MA

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RESEARCH SKILLS

Can design, implement, run, analyze, and write human subject studies, including studies leveraging brain-sensing (EEG/fNIRS) or other physiological sensors (Empatica, etc.), as well as studies which leverage human-state data to adapt real-time interfaces.

COMMUNICATION AND TEAMWORK

Am a team-first collaborator and highly skilled communicator. Able to distill complex ideas succinctly to people across a wide range of skill levels. I thrive in open-minded environments where constructive criticism is the norm.

TECHNICAL COMPETENCE

Am highly technically skilled. Very proficient in Python, R, C++, Bash, git, CI/CD Pipelines, Docker, and cloud deployments. Easily capable of learning any new language or framework quickly.

PROCESS OPTIMIZATION

Passionate about identifying and solving systemic problems that hinder operational efficiency or user experience. Skilled in analyzing complex systems and interfaces, identifying bottlenecks, and implementing concrete solutions to streamline processes and improve overall performance and happiness.

PUBLICATIONS

M. Russell, A. Shah, G. Blaney, J. Amores, A. Cambon, M. Czerwinski, R.J.K. Jacob, "Your Brain on an Interactive LLM" *[in review]* (2024).

M. Russell, S. Youkeles, A. Shah, E. Lai, R.J.K. Jacob, "Chess, Cognitive Neuroscience, and their Interaction with the MUSE 2 device for BCI" *[in review]* (2024).

M. Russell, S. Hincks, L. Wang, A. Babar, Z. Chen, Z. White, R.J.K. Jacob, "Visualization and Workload with Implicit fNIRS-based BCI" *[accepted]* (2024).

A. Bosworth, M. Russell, and R.J.K. Jacob, "fNIRS as an Input to Brain Computer Interfaces: A Review of Research from the Tufts Human Computer Interaction Laboratory," *Photonics* (2019).

T. Shibata, A. Borisenko, A. Hakone, T. August, L. Deligiannidis, C.H. Yu, M. Russell, A. Olwal, and R.J.K. Jacob, "An Implicit Dialogue Injection System for Interruption Management," *Proc. Tenth Augmented Human International Conference* (2019).

L. Hirshfield, D. Bergen-Cico, M. Costa, R.J.K. Jacob, S. Hincks, M. Russell, "Measuring the Neural Correlates of Mindfulness with Functional Near-Infrared Spectroscopy," *Empirical Studies of Contemplative Practices* (2018).

L. Hirshfield, R. Gulotta, S. Hirshfield, S. Hincks, M. Russell, R. Ward, T. Williams, and R. Jacob, "This is Your Brain on Interfaces: Enhancing Usability Testing with Functional Near-Infrared Spectroscopy," *Proc. ACM CHI 2011 Human Factors in Computing Systems Conference*, ACM Press (2011).

L. Hirshfield, S. Hirshfield, S. Hincks, M. Russell, R. Ward, T. Williams, "Trust in Human-Computer Interactions as Measured by Frustration, Surprise, and Workload.," *Foundations of Augmented Cognition. Directing the Future of Adaptive Systems*. (2011).

PROJECTS

Gradescope Autograder — C++ autograding framework. <https://rb.gy/t9r14h>

unit_test — VSCode Extension for unit-testing C++ code. <https://rb.gy/tex0so>