INDIE GARWOOD

indie_garwood@brown.edu
indiegarwoodphd.com

PROFESSIONAL APPOINTMENTS

Brown University, School of Engineering July 2026 – current
Assistant Professor of Engineering
Robert J. and Nancy D. Carney Institute for Brain Science
Rhode Island Hospital Department of Neurosurgery

University of Pennsylvania, Perelman School of Medicine May 2024 – May 2026
Provost's Postdoctoral Fellow | Neurosurgery
Advisor: Bijan Pesaran

Massachusetts Institute of Technology May 2023 – Apr. 2024
Postdoctoral Associate | The Picower Institute for Learning and Memory
Advisors: Emery Brown, Polina Anikeeva, and Earl Miller

EDUCATION

Doctor of Philosophy | Health Sciences and Technology (HST) Sept. 2017 – June 2023
Massachusetts Institute of Technology and Harvard Medical School Cambridge, MA

- Medical Engineering and Medical Physics (MEMP)
- Thesis: Probing the depths of unconsciousness with multifunctional neurotechnology
- Concentration Area: Brain and Cognitive Sciences
- NIH T32 Neurobiological Engineering Trainee
- HST Introduction to Clinical Medicine: 12-week clinical clerkship based at Mount Auburn Hospital

Bachelor of Science in Engineering | Biomedical Engineering Sept. 2013 – Apr. 2017
University of Michigan – Ann Arbor Ann Arbor, MI

- Concentration Area: Biochemical Engineering

FELLOWSHIPS

Provost's Postdoctoral Fellowship | University of Pennsylvania 2024-2026

MathWorks Fellowship | MIT School of Engineering 2021-2022, 2022-2023

Graduate Research Fellowship Program | National Science Foundation 2017-2022

Neurobiological Engineering Training Program | MIT, NIH 5T32EB019940-07 2019-2020

Engineering Honors Scholarship | University of Michigan – Ann Arbor 2013-2017

AWARDS

Society for Neuroscience Trainee Professional Development Award 2022, 2025

James B. Angell Scholar | University of Michigan – Ann Arbor 2015-2016

William J. Branstrom Freshman Prize | University of Michigan – Ann Arbor 2014

PUBLICATIONS

Garwood, I.C., Major, A.J., Antonini,M.-J., Correa, J., Lee, Y., Sahasrabudhe, A, Mahnke, M.K., Miller, E.K.*, Brown, E.N.*, Anikeeva, P.* (2023). Multifunctional fibers enable modulation of cortical and deep brain activity during cognitive behavior in macaques. *Science Advances*. doi:10.1126/sciadv.adh0974
(* – equal contributions)

Garwood, I.C.*, Chakravarty, S.*, Donoghue, J.A., Mahnke, M.K., Kahali, P., Chamadia, S., ... Brown, E.N. (2021). A hidden Markov model reliably characterizes ketamine-induced spectral dynamics in macaque local field potentials and human electroencephalograms. *PLoS computational biology*. doi:10.1371/journal.pcbi.1009280

Rice, I.C., Zimmerman, L.L., Ross S.E., Berger, M.B., Bruns, T.M. (2017). Time-Frequency Analysis of Increases in Vaginal Blood Perfusion Elicited by Long-Duration Pudendal Neuromodulation in Anesthetized Rats. *Neuromodulation*, 20(8), 807-815. doi:10.1111/ner.12707

Haggerty, J., Qureshi, Q., Gabriel, E.D., Borges, P.G., Davis, P., Wingel, K., Cai, J., Sargur, K., Kim, M.J., Dubey, A., **Garwood, I.**, ..., Cajigas, I. (2026). Thalamus: a real-time system for synchronized, closed-loop multimodal behavioral and electrophysiological data capture. *Communications Engineering*. doi:10.1038/s44172-026-00646-z

Chakravarty, S.*, Donoghue, J.A.*, Waite, A.S., Mahnke, M.K., **Garwood, I.C.**, Gallo, S., Miller, E.K.*, Brown, E.N.* (2023). Closed-loop control of anesthetic state in non-human primates. *PNAS Nexus*. doi:10.1093/pnasnexus/pgad293

Sahasrabudhe, A.*, Rupprecht, L.E.*, Orguc, S.*, Khudiyev, T.*, Tanaka, T., Sands, J., Zhu, W., Tabet, A., Manthey, M., Allen, H., Loke, G., Antonini, M.J., Rosenfeld, D., Park, J., **Garwood, I.C.**, ... Anikeeva, P. (2023). Multifunctional microelectronic fibers enable wireless modulation of gut and brain neural circuits. *Nature Biotechnology*. doi:10.1038/s41587-023-01833-5

Lee, Y., Koehler, F., Dillon, T., Loke, G., Kim, Y., Marion, J., Antonini, M.J., **Garwood, I.C.**, ... Anikeeva, P. (2023). Magnetically actuated fiber-based soft robots. *Advanced Materials*. doi:10.1002/adma.202301916

Cajigas, I., Davis, K.C., Meschede-Krasa, B., Prins, N.W., Gallo, S., Naeem, J.A., Palermo, A., Wilson, A., Guerra, S., Parks, B.A., Zimmerman, L., Gant, K., Levi, A.D., Dietrich, W.D., Fisher, L., Vanni, S., Tauber, J.M., **Garwood, I.C.**, ... Jagid, J. (2021). Implantable brain–computer interface for neuroprosthetic-enabled volitional hand grasp restoration in spinal cord injury. *Brain Communications*. doi:10.1093/braincomms/fcac143

Antonini, M. J.*, Sahasrabudhe, A., Tabet, A., Schwalm, M., Rosenfeld, D., **Garwood, I.C.**, ... Anikeeva, P. (2021). Customizing MRI-Compatible Multifunctional Neural Interfaces through Fiber Drawing. *Advanced Functional Materials*. doi:10.1002/adfm.202104857

Abel, J.H.*, Badgeley, M.A.*, Meschede-Krasa, B., Schamberg, G., **Garwood, I.C.**, Lecamwasam, K., ... Brown, E.N. (2021). Machine learning of EEG spectra classifies unconsciousness during GABAergic anesthesia. *PLoS ONE*. doi:10.1371/journal.pone.0246165

Frank, J.A., Antonini, M.J., Chiang, P.H., Canales, A., Konrad, D.B., **Garwood, I.C.**, ... Anikeeva, P. (2020). In vivo photopharmacology enabled by multifunctional fibers. *ACS chemical neuroscience*. doi:10.1021/acschemneuro.0c00577

Zimmerman, L.L., **Rice, I.C.**, Berger, M.B. and Bruns, T.M. (2018). Tibial nerve stimulation to drive genital sexual arousal in an anesthetized female rat. *The journal of sexual medicine*. doi:10.1016/j.jsxm.2018.01.007

Foerster, B.R., Nascimento, T.D., DeBoer, M., Bender, M.A., **Rice, I.C.**, Truong, D.Q., Bikson, M., Clauw, D.J., Zubieta, J.K., Harris, R.E., DaSilva, A.F. (2015). Excitatory and inhibitory brain metabolites as targets and predictors of effective motor cortex tDCS therapy in fibromyalgia. *Arthritis and Rheumatology*. doi:10.1002/art.38945

Manuscripts in Preparation

Garwood, I.C., Major, A.J., Ballesteros, J.J., Donoghue, J.A., Mahkne, M.K., Anikeeva, P.*, Miller, E.K.*, Brown, E.N.* Synchronized gamma bursts induced by high dose ketamine result in altered states of consciousness.

Conferences and Presentations (last 3 years)

Garwood, I.C., Wingel, K., Nair, G., Pesaran, B. Neural population dynamics coordinate visuomotor behavior. Annual Interdisciplinary Conferece, Jackson, WY, January 2026. (Oral presentation)

Garwood, I.C., Wingel, K., Nair, G., Pesaran, B. Neural population dynamics in posterior parietal cortex coordinate visuomotor behavior. Society for Neuroscience 52nd Annual Meeting, San Diego, CA, November 2025. (Poster)

Garwood, I.C., Wingel, K., Nair, G., Pesaran, B. Parietal population dynamics coordinate visuomotor behavior. Simian Collective, Durham, NC, August, 2025. (Poster)

Garwood, I.C., Major, A.J., Choi, J., Viventi, J., Charles, A., Miller, E.K., Anikeeva, P., Brown, E.N Pesaran, B. Characterizing multiregional dynamic responses to neuromodulation with multifunctional neurotechnology. Annual Interdisciplinary Conferece, Jackson, WY, January 2025. (Oral presentation)

Garwood, I.C., Choi, J., Wingel, K., Stefanowicz, J., Chiang, C.H., Dubey, A., Viventi, J., Charles, A., Pesaran, B. System and method for calcium imaging and electrophysiology in non-human primates. Society for Neuroscience 51st Annual Meeting, Chicago, IL, October 2024. (Poster)

Garwood, I.C., Choi, J., Wingel, K., Stefanowicz, J., Chiang, C.H., Dubey, A., Viventi, J., Charles, A., Pesaran, B. Multiregional neuronal calcium imaging during cortical electrical stimulation. Simian Collective, Pittsburgh, PA, September 2024. (Poster)

Garwood, I.C., Major, A.J., Ballesteros, J.J., Donoghue, J.A., Mahkne, M.K., Miller, E.K., Anikeeva, P., Brown, E.N. Ketamine anesthesia induces coordinated multiarea gamma bursts and disruption of sensory processing in macaques. Society for Neuroscience 50th Annual Meeting, Washington, DC, November 2023. (Oral presentation)

Garwood, I.C., Major, A.J., Ballesteros, J.J., Donoghue, J.A., Mahkne, M.K., Anikeeva, P., Miller, E.K., Brown, E.N. Probing altered states of consciousness during ketamine anesthesia. Simian Collective, Chicago, IL, September 2023. (Oral presentation)

Garwood, I.C., Ballesteros, J.J., Donoghue, J.A., Mahkne, M.K., Anikeeva, P., Miller, E.K., Brown, E.N. The dynamics of the unconscious brain under ketamine anesthesia. Gordon Research Conference on Consciousness, Anesthesia and Evolutionary Biology, Easton, MA, June 2023. (Poster)

Invited Seminars

Neural interfaces for controlling brain states: From anesthesia to psychiatry — February 2024
Host: Brown University School of Engineering — Providence, RI

Probing the depths of anesthesia with multifunctional neurotechnology — April 2023
Host: Professor Mark Richardson, Massachusetts General Hospital — Boston, MA

Probing cortical and deep brain electrochemical signaling during cognitive behavior — January 2023
Host: Neurosurgery Department, National Institutes of Health — Bethesda, MD

Teaching and Mentoring Experience

Master's Student Mentor: Addressing motion artifacts in calcium imaging data — Spring 2024-Current
University of Pennsylvania — Philadelphia, PA

Master's Student Mentor: Multiphoton cellular fluorescence imaging in primates — Fall-Spring 2024
University of Pennsylvania — Philadelphia, PA

Teaching Assistant: 9.07 Statistics for Brain and Cognitive Science Fall 2023
Massachusetts Institute of Technology Cambridge, MA

UROP Mentor: Optimization of multifunctional fibers Spring 2022
Massachusetts Institute of Technology Cambridge, MA

UROP Mentor: Optogenetic transfection of VIP cells Spring 2021 – Winter 2022
Massachusetts Institute of Technology Cambridge, MA

UROP Mentor: Thermal draw tower optimization Fall 2020 – Fall 2021
Massachusetts Institute of Technology Cambridge, MA

High School Research Mentor: Using HMMs to study neural oscillations Spring 2021
Massachusetts Institute of Technology Cambridge, MA

Teaching Assitant: MATLAB for Medicine Summer 2018
Harvard Medical School Boston, MA

Activities and Service

Ad-hoc Reviewer 2023 – 2024
IOP Trusted Reviewer

IMES Diversity Equity and Inclusion Committee 2021 – 2023
One of three elected student representatives advocating for increased inclusivity MIT

Graduate Student Advisory Group for Engineering 2021 – 2023
Serving on the DEI advisory committee to the Dean of Engineering, Prof. Anantha P. Chandrakasan MIT

MEMP Application Assistance Program 2021, 2022
Provided one-on-one mentorship for students from underrepresented backgrounds applying to MEMP MIT

Student representative for the IMES Visiting Committee meeting 2022
One of eight students selected by IMES leadership to advocate for student priotrities in IMES MIT

IEEE EMBS International Student Conference 2021
Served as programming chair and moderator for conference with 55 attendees (Conference website) Virtual

Reject Injustice Through Student Empowerment 2020 – 2021
Worked with graduate students across MIT to advocate against racism, sexism, and other discrimination MIT

HST Joint Council Social Chair 2017 – 2018
Planned and organized departmental socials Harvard/MIT

Sexual Assault Prevention and Awareness Center 2015 – 2017
Completed ally training and organized advocacy resources for the College of Engineering UofM