



Exponent[®]
Engineering & Scientific Consulting

Autumn Bullard, Ph.D.

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Professional Profile

Dr. Bullard's background is in biomedical engineering with a specialization in neural engineering and neural prostheses. She has used her skillset in signal processing, implementing machine learning algorithms, designing and fabricating printed circuit boards, and embedded systems engineering to develop implantable devices for brain machine interfaces. Dr. Bullard has experience programming in MATLAB, C++, and Labview as well as experience with SOLIDWORKS, Eagle CAD, FIJI/ImageJ, and NEURON software. Furthermore, she has extensive experience with non-human primate experimental design, behavioral training, and sterile surgical techniques.

Prior to joining Exponent, Dr. Bullard obtained her doctorate from the University of Michigan where she was a research assistant in the Cortical Neural Prosthetics Lab. Her doctoral work focused on designing electronics for an implantable neural recording system to facilitate brain machine interfaces for applications in functional electrical stimulation and upper-limb prosthesis. This work involved in vivo testing, investigation of power reduction techniques, and the characterization of intracranial device-related complications and safety concerns. Dr. Bullard has been involved in both human and non-human primate studies where she gained experience processing intracortical and electromyography (EMG) signals, analyzing histology, and writing systematic reviews and an Investigational Device Exemption (IDE) for FDA submission.

Academic Credentials & Professional Honors

Ph.D., Biomedical Engineering, University of Michigan, Ann Arbor, 2019

M.S.E., Biomedical Engineering, University of Michigan, Ann Arbor, 2016

B.S., Electrical and Electronics Engineering, Norfolk State University, 2013

National Science Foundation Graduate Research Fellowship

Rackham Merit Fellowship, University of Michigan

Prior Experience

Graduate Research Assistant, University of Michigan, 2013-2019

Graduate Teaching Assistant, University of Michigan, 2017-2018

Professional Affiliations

Society for Neuroscience (SFN)

Institute of Electrical and Electronics Engineers (IEEE)

National Society of Black Engineers (NSBE)

Publications

AJ Bullard, SR Nason, ZT Irwin, CS Nu, B Smith, A Campean, PH Peckham, KL Kilgore, MS Willsey, PG Patil, CA Chestek, "Design and Testing of a 96-Channel Neural Interface Module for the Networked Neuroprosthesis System." *Bioelectronic Medicine.*, 2019.

PP Vu, ZT Irwin, A. Bullard, SL Woo, MG Urbanek, PS Cederna, and CA Chestek, "Closed-Loop Continuous Hand Control via Chronic Recording of Regenerative Peripheral Nerve Interfaces," *IEEE Trans. Neural Syst. Rehabil. Eng.*, 2018.

ZT Irwin, KE Schroeder, PP Vu, AJ Bullard, DM Tat, CS Nu, A Vaskov, SR Nason, DEThompson, JN Bentley, PG Patil, and CA Chestek, "Neural control of finger movement via intracortical brain-machine interface," *J. Neural Eng.*, 2017.

KE Schroeder, ZT Irwin, AJ Bullard, DE Thompson, JN Bentley, WC Stacey, P. Patil, and CA Chestek, "Robust tactile sensory responses in finger area of primate motor cortex relevant to prosthetic control," *J. Neural Eng.*, 2017.

ZT Irwin, KE Schroeder, PP Vu, DM Tat, AJ Bullard, SL Woo, IC Sando, M. Urbanek, PS Cederna, and CA Chestek, "Chronic recording of hand prosthesis control signals via a regenerative peripheral nerve interface in a rhesus macaque," *J. Neural Eng.*, 2016.

ZT Irwin, DE Thompson, KE Schroeder, DM Tat, A Hassani, AJ Bullard, SL Woo, MG Urbanek, AJ Sachs, PS Cederna, WC Stacey, PG Patil, and CA Chestek, "Enabling low-power, multi-modal neural interfaces through a common, low-bandwidth feature space," *IEEE Trans. Neural Syst. Rehabil. Eng.*, vol.24, no. 5, p. 521-531, 2015.

Presentations

AJ Bullard, PG Patil, CA Chestek, "Safety of Implantable Cortical-Controlled FES Device for Clinical Use," *Neural Interfaces Conference, Minneapolis, MN, 2018*

AJ Bullard, ZT Irwin, KE Schroeder, SR Nason, B Smith, A Campean, PG Patil, PH Peckham, KL Kilgore, CA Chestek, "Design and Testing of a Low Power Neural Interface Module for the Networked Neuroprosthesis System," *North American Neuromodulation Society, Las Vegas, NV, 2017*

A. J. Bullard, Z. T. Irwin, K. E. Schroeder, B. Smith, A. Campean, P. G. Patil, P. H. Peckham, K. L. Kilgore, C. A. Chestek, "Design and Testing of a Low Power Neural Interface Module for the Networked Neuroprosthesis System," *Society for Neuroscience, San Diego, CA, 2016*

A. J. Bullard, D. E. Thompson, J. Jeong, J. Bell, K. A. Malaga, P.G. Patil, M. Flynn, C. A. Chestek, "Testing a Novel Integrated Circuit for Closed Loop Deep Brain Stimulation," *MCubed Symposium, Ann Arbor, MI, 2014*