K A T E D. F I S C H L

3600 N. Charles St | Baltimore, MD 21218 | 856-630-3154 | kfischl1@jhu.edu

---

EDUCATION

Johns Hopkins University, Baltimore MD
Ph.D. in Electrical and Computer Engineering, 3.8 GPA — Expected Spring 2019
M.S.E. in Electrical and Computer Engineering, 3.8 GPA — May 2016

Princeton University, Princeton NJ
B.S.E. in Electrical Engineering, 3.3 GPA — June 2011
Concentration in Computer Design;
Minors in Bio-Engineering and Robotics & Intelligent Systems

RESEARCH SKILLS

- Neuromorphic hardware, neuromorphic algorithms, machine learning, modeling, data analysis
- Programming: MATLAB, Python, Java, BASIC, C, C++, Assembly, VHDL, Verilog

RESEARCH AND DEVELOPMENT EXPERIENCE

PhD Candidate, Advised by Andreas Andreou, Johns Hopkins University, Baltimore, MD
August 2014 – Present

- Neural and Behavioral Modeling: Creating models of the Rhesus macaque amygdala at different levels of abstraction to better understand the breakdown of social behavior during mental illness.
  - Utilized the Nengo neural simulator to create functional models of the Rhesus amygdala to replicate firing patterns as measured in real data in order to understand connectivity.
  - Implemented point process modeling to predict neuron spiking based on covariates.
  - Implemented Bayesian change point detection to determine neuron firing rate changes in response to eyeblinks and saccades.
  - Determined role of eyeblinks as a socio-emotional behavioral response, not simply a physiological imperative to protect the eyes through a film of tears.
- Neuromorphic Hardware: Implementing spike-based algorithms, neuromorphic models, and deep neural networks on multiple neuromorphic platforms to explore tradeoffs and limitations.
  - Implemented a spike wave propagation path-planning algorithm on IBM's TrueNorth to find solutions for maps two orders of magnitude larger than existing solutions.
  - Created a real-time system to recognize handwritten digits using the Asynchronous Time-based Image Sensor (ATIS) and IBM's TrueNorth.
  - Implementing the Neural Engineering Framework on IBM's TrueNorth to explore the limitations of this neuromorphic platform for modeling.
  - Executing neuromorphic amygdala models on Intel's Loihi, Stanford's Braindrop, and SpiNNaker to understand tradeoffs and limitations.
- Bat Location Identification: Developed an algorithm and associated user GUI to separate bat echolocation pings for data analysis facilitation as part of an effort to understand bat communication within a multi-bat group.
- VLSI Design: Created circuitry and layout for input/output pads with associated ESD circuitry as part of a lab-wide fabrication effort.

Assistant Staff, MIT Lincoln Laboratory, Bioengineering Systems and Technologies Group, Lexington, MA — September 2011 – July 2014

- Physiological Monitoring: Project goals included building systems and software to measure, categorize, and predict human fatigue to subsequently prevent injury.

    - Designed, assembled, and tested wearable embedded electronic systems and their associated software to record impact forces, acceleration, and gyration using instrumented boots.
    - Designed, assembled, and tested a low-power wearable system to monitor and record heart rate, skin temperature, and acceleration continuously over multiple days.
    - Created MATLAB algorithms to analyze and visualize data from heart rate monitors, accelerometers, and instrumented boots.
    - Aided in field test collections and the subsequent organization and analysis of physiological data.
- Noise Dosimetry: Project goals included building wearable high-decibel noise recorders to collect data for use in modeling solider hearing loss.
    - Designed, assembled, and tested embedded wearable electronic systems to record high-decibel noise. (Patented)
    - Co-architected, implemented, and tested the associated embedded C++ code.
- Cognitive Robotics: Project goals included implementing a biomimetic MATLAB simulation of a simplified brain for situational awareness applications.
    - Designed, implemented, and tested MATLAB simulation.

NSF Summer Intern, University of Maryland, College Park, MD Summer 2010
- Analyzed ChIP-Seq (chromatin immunoprecipitation and high-throughput sequencing) peak detection algorithms for improved location of histone proteins.
- Studied epigenetic correlation between histone location and gene expression or malfunction.

Undergraduate Researcher, Princeton University, Princeton, NJ Summer 2009
- Fabricated stretchable micro-electric arrays (SMEAs) inside a clean room laboratory.
- Tested SMEAs for biological compatibility with neuron cells.
- **Equipment**: 3" Mask Aligner, Reactive Ion Etch and Plasma Enhanced Chemical Vapor Depositor, Optical Microscope, Electron Beam Evaporator, Vacuum Hot Plate, Spinners

Lab Assistant, PortaScience Inc., Moorestown, NJ Summer 2007
- Developed, tested, and manufactured test strips and dye indicators for point-of-care testing devices.

PUBLICATIONS

- **Fischl, Kate D.,** et al. " Implementation of the Neural Engineering Framework on the TrueNorth Neurosynaptic System." *Biomedical Circuits and Systems Conference (BioCAS), 2018 IEEE*. IEEE, 2018. Accepted.
- **Fischl, K. D.**, K. Fair, Wei-Tsai, J. Sampson and A. G. Andreou. "Spike propagation path planning on the IBM TrueNorth Neurosynaptic System." *Electronics Letters* (2017).
- **Fischl, Kate D.,** et al. "Neuromorphic self-driving robot with retinomorphic vision and spike-based processing/closed-loop control." *Information Sciences and Systems (CISS), 2017 51st Annual Conference on*. IEEE, 2017.
- Ballesta, Sébastien, Clayton P. Mosher, Jeno Szep, **Kate D. Fischl**, and Katalin M. Gothard. "Social determinants of eyeblinks in adult male macaques." *Scientific Reports* 6 (2016).
- Andreou, Andreas G., Andrew A. Dykman, **Kate D. Fischl**, Guillaume Garreau, Daniel R. Mendat, Garrick Orchard, Andrew S. Cassidy et al. "Real-time sensory information processing using the TrueNorth neurosynaptic system." In *Circuits and Systems (ISCAS), 2016 IEEE International Symposium on*, pp. 2911-2911. IEEE, 2016.
- Williamson, J R ; Dumas, A ; Hess, A R ; Patel, T ; Telfer, B A ; **Fischl, K** ; Butler, M J, "Detecting Gait Asymmetry with Wearable Accelerometers", MIT Lincoln Laboratory, Lexington, MA, Rep. PSM-3, 18 Mar 2015.

- Jerome J. Braun ; Marianne A. DeAngelus ; **Kate D. Fischl** ; Austin R. Hess ; Danelle C. Shah; Building animats: neurobiomimetic approach for cognitive systems. Proc. SPIE 9121, Multisensor, Multisource Information Fusion: Architectures, Algorithms, and Applications 2014, 91210M (May 22, 2014).
- Hughes, T.B., Willimason, J.R., Hess, A.R., Young, W.T., Dumas, A., **Fischl, K. D**., and B.D. Telfer. *Solider Projection Benchmark Evaluation (SPBE) Physiological Data Collection and Analysis*. Rep. no. 1174. Lexington: MIT Lincoln Laboratory, 2013. Print.
- Williamson, James R.; **Fischl, Kate**; Dumas, Andrew; Hess, Austin; Hughes, Tadd; Buller, Mark J., "Individualized detection of ambulatory distress in the field using wearable sensors," Body Sensor Networks (BSN), 2013 IEEE International Conference on, 6-9 May 2013.
- **Fischl K**. "A Smart Health News Update Application." Princeton University Senior Independent Project. January 2011.

PATENTS

- Lacirignola, Joseph J.; Vian, Trina Rae; Aubin Jr., David F.; Quatieri, Thomas F.; **Fischl, Kate D**.; Collins, Paula P.; Smalt, Christopher J.; Gatewood, Paul D.; Malyska, Nicolas; Maurer, David C., Methods and Apparatus For Recording Impulsive Sounds. Patent Application No. 20150162047. June 2015.

PRESENTATIONS

- "Exploring Nuclear Connectivity and Function Within the Primate Amygdala Using the Neural Engineering Framework". **Kate D. Fischl**, Terrence C. Stewart, Katalin M. Gothard, Andreas Andreas. Poster to be presented at Society for Neuroscience Annual Meeting, San Diego, CA, November 6, 2018.
- "Machine Learning and Graph Analytics using Neuromorphic Multiprocessor Architectures". Dan R. Mendat, **Kate D. Fischl**, Martin Villemur, Andreas G. Andreou, Pedro Julian. Poster presented at: 2018 Northrop Grumman Mission System University Research Symposium, Baltimore, MD, April 17-18, 2018.
- "Path Planning on the TrueNorth Neurosynaptic System". **Kate Fischl**, Kaitlin Fair, Wei-Yu Tsai, Jack Sampson, Andreas G. Andreou. Conference talk presented at: IEEE International Symposium on Circuits & Systems, Baltimore, MD, May 31, 2017.
- "Neuromorphic Self-Driving Robot Platform". **Kate Fischl**. Presented as a subsection of "Cognitive Computing Architecture for Machine Learning, Data Center Processing and Internet of Things". Conference tutorial presented at: IEEE International Symposium on Circuits & Systems, Baltimore, MD, May 28, 2017.
- "Women in ECE & CS Mentoring Dinner". Moderated panel discussion on personal experiences as women within ECE & CS at varying career stages. Attended by 90+ faculty and students. Johns Hopkins University, December 5, 2016.
- "Open Body Area Network (OBAN): An Open Architecture Prototype for a tactical body sensor network". Anthony L, Lacirignola J, Aguilar C, Aubin D, Biddle J, Brigada D, Merfeld M, **Fischl K**, Maurer D, Telfer B, Palmer J, Buller M, Mullen S, Tharion W, Hoyt R. Poster Presented at: Body Sensor Networks (BSN) 2013 IEEE International Conference, Cambridge, MA, May 6-9, 2013.
- "Individualized Detection of Ambulatory Distress in the Field using Wearable Sensors". Williamson J, **Fischl K,** Dumas A, Hess A, Hughes T, Buller M. Poster Session Presented at: Body Sensor Networks (BSN) 2013 IEEE International Conference, Cambridge, MA, May 6-9, 2013.
- "Comparison of Histone Protein Locating Algorithms". **Fischl, K**. Poster presented at: MERIT-BIEN NSF Fair, University of Maryland, College Park, MD, August 6, 2010.

TEACHING EXPERIENCE

Course Co-Instructor, Johns Hopkins University, Baltimore, MD — Fall 2017
- Developed and presented lectures for graduate course entitled "Sensory Information Processing".

STEM Mentor, Western High School, Baltimore, MD — Spring 2017 - Present
- Designed and orchestrated a wearable electronics after-school workshop to teach students the skills needed to solder, program, and assemble an Arduino-based light-up necklace.

Teaching Assistant, Johns Hopkins University, Baltimore, MD — Fall 2015
- Facilitated laboratory section for a course on VHSIC Hardware Description Language (VHDL) in which students are required to complete ten different projects, including implementing a finite state machine, frequency-shift keying, phase locked loop, and tone detection, among others.

Undergraduate Teaching Assistant, Princeton University, Princeton, NJ — Spring 2011
- Facilitated laboratory section of the electrical engineering design course in which students designed and built an autonomous camera-driven model car.

STEM LEADERSHIP EXPERIENCE

Graduate Association of Women in CS & ECE President and Co-Founder — Fall 2015 – Spring 2018
- Founded organization. Organized weekly lunches and other networking and social events.

JHU ECE Graduate Student Association Officer — Fall 2015 – Fall 2017
- Organized department social and educational events for graduate students.

Lincoln Laboratory Recent Graduate Employee Resource Group Co-Chair and Co-Founder — Fall 2011 – Spring 2014
- Organized lectures, lunches, and email listserv, and provided resources for participants.

Princeton Biomedical Engineering Society President and Co-Founder
- Planned events, found speakers, and provided resources. — Summer 2010 – June 2011

OTHER LEADERSHIP EXPERIENCE

JHU Jewish Graduate Student Association Co-Chair, Baltimore, MD — Fall 2015 – Summer 2017
- Planned and orchestrate social and holiday events.

2011 Princeton Commencement Committee Member, Princeton, NJ — Fall 2010 – Spring 2011
- Designed and ordered class jackets. Helped plan and organize commencement activities.

Center for Jewish Life Vice President, Princeton, NJ — January 2009 – June 2011
- Oversaw planning and execution of all events. Led and managed the student board.

Club Swimming Officer, Princeton, NJ — Fall 2008 – Spring 2011
- Helped run practices, organize meets, and plan social events.

Outdoor Action Leader, Princeton NJ — September 2010, 2011
- Led freshman pre-orientation wilderness backpacking trip.

AWARDS

- **Baltimore Women in Tech Micro-Grant Recipient** — May 2017
- **NSF Graduate Research Fellowship** — April 2016
- **Dean's Fellowship**, Johns Hopkins University — September 2014
- **NSF Graduate Research Fellowship Honorable Mention** — April 2014
- **Best Oral Presentation**, University of Maryland NSF Fair — August 2010
- **Second Best Overall Project**, University of Maryland NSF Fair — August 2010

PROFESSIONAL MEMBERSHIP

- IEEE, IEEE Women in Engineering (WIE), Society for Neuroscience