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

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EDUCATION

Johns Hopkins University, Baltimore MD
Ph.D. in Electrical and Computer Engineering, 3.8 GPA — Expected May 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, Java, Python, BASIC, C, C++, Assembly, VHDL, Verilog

RESEARCH AND DEVELOPMENT EXPERIENCE

PhD Candidate, Advised by Andreas Andreou, Johns Hopkins University — 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 and Bayesian change point detection to predict neuron spiking and determine changes in firing rates.
- 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 processor to find solutions for maps two orders of magnitude larger than existing solutions.
  - Mapped the Neural Engineering Framework on IBM's TrueNorth processor to explore the limitations of this neuromorphic platform for modeling.
  - Executed neuromorphic amygdala models on Intel's Loihi, Stanford University's Braindrop, and the University of Manchester's SpiNNaker to understand tradeoffs and limitations.
- VLSI Design: Created circuitry and layout for I/O pads with as part of a lab-wide fabrication effort.

Computer Engineer, 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 systems.
  - 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 and associated embedded software to record high-decibel noise. (Patented)
- Cognitive Robotics: Project goals included implementing a biomimetic MATLAB simulation of a simplified brain for situational awareness applications.
  - Designed, implemented, and tested MATLAB simulation.

SELECTED PUBLICATIONS

- **Fischl, Kate D.,** et al. "Neural Modeling on the TrueNorth Neurosynaptic System Using the Neural Engineering Framework." *Circuits and Systems (ISCAS), 2019 IEEE International Symposium on*. IEEE, 2019. Submitted.
- **Fischl, Kate D.,** et al. "Socio-Emotional Robot with Distributed Multi-Platform Neuromorphic Processing." *Circuits and Systems (ISCAS), 2019 IEEE International Symposium on*. IEEE, 2019. Submitted.
- **Fischl, Kate D.**, et al. "Implementation of the neural engineering framework on the TrueNorth neurosynaptic system." *2018 IEEE Biomedical Circuits and Systems Conference (BioCAS)*. IEEE, 2018.
- **Fischl, K. D.**, et al. "Spike propagation path planning on IBM TrueNorth neurosynaptic system." *Electronics Letters* 53.15 (2017): 1023-1025.
- **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.
- 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).
- 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.

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.

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) where students implement ten different projects, including a finite state machine, frequency-shift keying, tone detection, etc.

STEM LEADERSHIP EXPERIENCE

Graduate Association of Women in CS & ECE President and Co-Founder — Fall 2015 – Spring 2018
- Founded organization. Organized weekly lunches, and 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 Grad Employee Resource Group Co-Chair and Co-Founder — Fall 2011 – Spring 2014
- Organized lectures, lunches, and email listserv, and provided resources for participants.

AWARDS

- **Baltimore Women in Tech Micro-Grant Recipient** — May 2017
- **NSF Graduate Research Fellowship** — April 2016
- **Dean's Fellowship**, Johns Hopkins University — September 2014

PROFESSIONAL MEMBERSHIP

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