Austin J. Brockmeier

Evans Hall
139 The Green
University of Delaware
Newark, DE 19716 USA

ajbrock@udel.edu
https://www.eecis.udel.edu/~ajbrock

Education

Ph.D., Electrical and Computer Engineering, University of Florida, Gainesville, FL May 2014
Dissertation: "Learning and Exploiting Recurrent Patterns in Neural Data"

B.S., Computer Engineering, University of Nebraska–Lincoln, Omaha, NE May 2009
Highest Distinction, 2nd Major: Mathematics, Minor: Computer Science

Experience

Assistant Professor University of Delaware, Newark, Delaware Dec. 2018–Present
Dept. of Electrical and Computer Engineering; Dept. of Computer and Information Sciences
Data Science Institute (Resident Fellow)

Research Fellow University of Manchester, United Kingdom Mar. 2017–Oct. 2018
School of Computer Science

Research Associate University of Liverpool, United Kingdom Jun. 2014–Feb. 2017
School of Electrical Engineering, Electronics and Computer Science

Graduate Research Assistant University of Florida May 2010–May 2014
Department of Electrical and Computer Engineering

Research Assistant University of Nebraska–Lincoln (Omaha Campus) Summer 2008 & 2009
Department of Computer and Electronics Engineering

Electronics Engineer Cenatmed, LLC, Omaha, Nebraska Apr. 2008–July 2009

IT Operations Intern Union Pacific Railroad, Omaha, Nebraska Aug. 2006–Aug. 2008

Honors and Awards

- Top 200 Reviewer, Neural Information Processing Systems (NeurIPS) 2018
- Honorable Mention, Outstanding Service, Graduate Student Council, U. Florida 2014
- Finalist, IEEE EMBS Conference Student Paper Competition 2013
- Honorable Mention, NSF Graduate Research Fellowship 2009, 2010, 2011
- University of Florida Graduate School Fellowship 2009–2013
- Dean's Award, College of Engineering, University of Nebraska 2009
- Outstanding Senior, Computer and Electronics Engineering Dept. (CEEN) 2009
- Undergraduate Major Honoree, CEEN 2009
- 1st Place Senior Thesis Design Team, Comp. and Electronics Eng. Dept. 2009
- James Earl Mathematics Scholarship, Math. Dept., U. Nebraska Omaha 2008–2009

Research Support

- University of Delaware Research Foundation—Strategic Initiatives (UDRF-SI) 2020
  "Advancing machine learning for neuroimaging through topology-aware signal processing" ($45,000) Role: Principal Investigator, Senior Mentor: Gonzalo Arce
- Mini Grant, University of Delaware's Data Science Institute 2019–2020
  Funding through a seed grant from the Unidel Foundation. "Learning to predict systematic errors in machine learning models and alert an expert for improved synergistic performance" ($10,000)
- NSF East Asia and Pacific Summer Institutes Fellowship 2012
  "Signal processing techniques to separate and analyze brainwaves." ($5,836)
  Host: Andrzej Cichocki, RIKEN Brain Science Institute, Japan.

Teaching

Instructor, Signals and Systems (ELEG 305) U. Delaware Spring 2020
Undergraduate core requirement for Computer Engineering and Electrical Engineering.

Instructor, Large Scale Machine Learning (ELEG/FSAN 817) U. Delaware — Fall 2019
New course, developed as a second and capstone course in machine learning for graduate students. Covers computational and statistical scaling from both theoretical and practical perspectives.

1 guest lecture, Signals and Systems (ELEG 305) U. Delaware — Spring 2019

2 guest lectures, Search and Data Mining (CPEG/ELEG 457/657) U. Delaware — Spring 2019

1 guest lecture, Introduction to Data Mining (CISC 483/683) U. Delaware — Spring 2019

2 guest lectures, Text Mining (COMP 61332) U. Manchester — Spring 2018

Instructor (5 wks), Eng. Skills (ELEC 171/172)/MATLAB U. Liverpool — Spring 2016, Fall 2016

Guest Lecturer (8 wks), Neural Networks (ELEC 320) U. Liverpool — Spring 2015

Multiple guest lectures, Brain Machine Interfaces (EEL 6935) U. Florida — Fall 2011, Fall 2013

Ph.D. Student Advising

Hassan Baker, Electrical and Computer Engineering — Spring 2020-present

Bilal Riaz, Electrical and Computer Engineering — Fall 2019-present

Yuksel Karahan, Electrical and Computer Engineering — Spring 2019-present

Carlos Mendoza, Electrical and Computer Engineering — Winter 2019-present

M.S. Student Advising

C. Cesar Claros, Electrical and Computer Engineering — Summer 2019-present

Visiting Scholars

Edwin Salcedo, M.Sc., M.B.A., Bolivian Catholic University, La Paz — Summer 2019

Committee Member

Micahel J. De Lucia, Electrical and Computer Engineering — Ph.D. proposal Aug. 2019

Kuang Lu, Electrical and Computer Engineering — Ph.D. proposal Jun. 2019

Alejandro Parada-Mayorga, Ph.D. in Electrical and Computer Engineering — Defended July 2019

Pedagogy Training

- Inclusive Teaching Professional Development Workshop Series, University of Delaware
  College of Engineering Diversity Working Group — Spring/Fall 2019
- Course Design Institute, University of Delaware — June 2019
- Associate Fellow of The Higher Education Academy — March 2016

Outreach Activities

- Presenter, Serviam Girls Academy, "Measuring Electric Waves in the Brain" — 5/2019
- Project Judge, FIRST LEGO League SE Pennsylvania Regional Championship — 2/2019
- Engineering Discovery Day, University of Delaware, Alpha Omega Epsilon — 10/2018

Professional Involvement

- IEEE (Institute for Electrical and Electronics Engineers) — 2006–Present
  —Signal Processing Society — 2013–Present
  —Engineering in Medicine and Biology Society (EMBS) — 2010–Present
  University of Delaware Student Branch Counselor — 5/2019–Present

Academic Service (Reviewer)

- *IEEE Transactions on Signal Processing* — 1× in 2019
- *IEEE Access* — 2× in 2019
- *IEEE Transactions on Knowledge Data Engineering* — 2017– (3× in 2019)
- *IEEE Transactions on Neural Networks and Learning Systems* — 2015– (11× in 2019)
- *IEEE Transactions on Biomedical Engineering* — 2014, 2018
- AAAI 2020/2018; NeurIPS 2019/2018; MLSP 2019/2018; ICML 2019; ICASSP 2020/2019/2018/2009; IEEE NER 2019/2017/2013; EMNLP 2018;

University Service

- Neuroscience Planning Committee (Chaired by John Jeka) — Aug. 2019–Present
- Data Science Symposium, Planning Committee (Chaired by Greg Dobler & Zachary Collier) — Apr. 2019–Nov. 2019

UD ECE Department Service
– Representative, Blue & Golden Saturdays (undergraduate visit day) 3× in Fall 2019
– Representative, Alumni Weekend: "Mastering Makerspaces!" June 2019
– Representative, Delaware Decision Days (undergraduate visit day) 2× in Spring 2019

UD CIS Department Service
– Faculty Search Committee, Computer & Information Sciences (Chaired by Chien-Chung Shen) 2019–Present

Patents
U.S. Patent 10,531,806. J. Principe and **A. J. Brockmeier**, "Brain state advisory system and methods using calibrated metrics and optimal time-series decomposition," 1/14/2020.

Book Chapter
A. J. Brockmeier and J. C. Príncipe, "Decoding algorithms for brain machine interfaces," in *Neural Engineering*, Bin He, Ed. Springer, 2013, pp. 223–257.

Journal Articles
X. Evangelopoulos, **A. J. Brockmeier**, T. Mu, J. Y. Goulermas, "Circular object arrangement using spherical embeddings," *Pattern Recognition*, j.patcog.2019.107192, 2019.

A. J. Brockmeier, M. Ju, P. Przybyła, and S. Ananiadou, "Improving reference prioritisation with PICO recognition," *BMC Medical Informatics and Decision Making*, 19(256), 2019.

P. Przybyła, **A. J. Brockmeier**, and S. Ananiadou, "Quantifying risk factors in medical reports with a context-aware linear model," *Journal of the American Medical Informatics Association*, 26(6):537–546, 2019.

X. Evangelopoulos, **A. J. Brockmeier**, T. Mu, J. Y. Goulermas, "Continuation methods for approximate large scale object sequencing," *Machine Learning*, 108(4):595–626, 2019.

P. Przybyła, **A. J. Brockmeier**, G. Kontonatsios, M.-A. Le Pogam, J. McNaught, E. von Elm, K. Nolan, and S. Ananiadou, "Prioritising references for systematic reviews with RobotAnalyst: A user study," *Research Synthesis Methods*, 9(3):470–488, 2018.

A. J. Brockmeier, T. Mu, S. Ananiadou, and J. Y. Goulermas, "Self-tuned descriptive document clustering using a predictive network," *IEEE Transactions on Knowledge and Data Engineering*, 30(10):1929–1942, 2018.

A. J. Brockmeier, T. Mu, S. Ananiadou, and J. Y. Goulermas, "Quantifying the informativeness of similarity measurements," *Journal of Machine Learning Research*, 18(76):1–61, 2017.

G. Kontonatsios, **A. J. Brockmeier**, P. Przybyła, J. McNaught, T. Mu, J. Y. Goulermas, and S. Ananiadou, "A semi-supervised approach using label propagation to support citation screening," *Journal of Biomedical Informatics*, 72:67–76, 2017.

J. S. Choi, **A. J. Brockmeier**, D. McNiel, L. von Kraus, J. C. Principe, and J. T. Francis, "Eliciting naturalistic cortical responses with a sensory prosthesis via optimized microstimulation," *Journal of Neural Engineering*, 13(5):056007, 2016.

A. J. Brockmeier and J. C. Principe, "Learning recurrent waveforms within EEGs," *IEEE Transactions on Biomedical Engineering*, 63(1):43–54, 2016.

M. S. Emigh, E. G. Kriminger, **A. J. Brockmeier**, J. C. Príncipe, and P. M. Pardalos, "Reinforcement learning in video games using nearest neighbor interpolation and metric learning," *IEEE Transactions on Computational Intelligence and AI in Games*, 8(1):56–66, 2016.

J. C. Principe and **A. J. Brockmeier**, "Representing and decomposing neural potential signals," *Current Opinion in Neurobiology*, 31:13–17, 2015.

A. J. Brockmeier, J. S. Choi, E. G. Kriminger, J. T. Francis, and J. C. Principe, "Neural decoding with kernel-based metric learning," *Neural Computation*, 26(6):1080–1107, 2014.

L. Li, **A. J. Brockmeier**, J. S. Choi, J. T. Francis, J. C. Sanchez, and J. C. Príncipe, "A tensor-product-kernel framework for multiscale neural activity decoding and control," *Computational Intelligence and Neuroscience*, Article ID 87016, 2014.

L. Li, I. M. Park, **A. Brockmeier**, B. Chen, S. Seth, J. T. Francis, J. C. Sanchez, and J. C. Principe, "Adaptive inverse control of neural spatiotemporal spike patterns with a reproducing kernel Hilbert space (RKHS) framework," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 21(4):532–543, 2013.

J. S. Choi, M. M. DiStasio, **A. J. Brockmeier**, and J. T. Francis, "An electric field model for prediction of somatosensory (S1) cortical field potentials induced by ventral posterior lateral (VPL) thalamic microstimulation," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 20(2):161–169, 2012.

Refereed Conference Proceedings

X. Evangelopoulos, **A. J. Brockmeier**, T. Mu, and J. Y. Goulermas, "A graduated non-convexity relaxation for large scale seriation," in *SIAM Int. Conf. Data Mining (SDM)*, 2017.

M. Sato, **A. J. Brockmeier**, G. Kontonatsios, T. Mu, J. Y. Goulermas, J. Tsujii, and S. Ananiadou, "Distributed document and phrase co-embeddings for descriptive clustering," in *European Chapter of the Association for Computational Linguistics (EACL)*, 2017.

A. J. Brockmeier and J. C. Principe, "Explicit versus implicit source estimation for blind multiple input single output system identification," in *IEEE Int. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2015.

E. Santana, **A. J. Brockmeier**, and J. C. Principe, "Joint optimization of algorithmic suites for EEG analysis," in *IEEE Engineering in Medicine and Biology Society (EMBC)*, 2014.

A. J. Brockmeier, E. Santanna, L. Sanchez Giraldo, and J. Principe, "Projentropy: Using entropy to optimize spatial projections," in *IEEE Int. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2014.

A. J. Brockmeier, L. G. Giraldo, J. S. Choi, J. T. Francis, and J. C. Principe, "Learning multiscale neural metrics via entropy minimization," in *Int. IEEE/EMBS Conf. Neural Engineering (NER)*, 2013.

A. J. Brockmeier, L. G. Sanchez Giraldo, M. S. Emigh, J. Bae, J. S. Choi, J. T. Francis, and J. C. Principe, "Information-theoretic metric learning: 2–D linear projections of neural data for visualization," in *IEEE Engineering in Medicine and Biology Society (EMBC)*, 2013. **[Student Paper Competition Finalist]**

A. J. Brockmeier, J. C. Principe, A. H. Phan, and A. Cichocki, "A greedy algorithm for model selection of tensor decompositions," in *IEEE Int. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2013.

A.-H. Phan, A. Cichocki, P. Tichavsky, G. Luta, and **A. Brockmeier**, "Tensor completion through multiple Kronecker product decomposition," in *IEEE Int. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2013.

A. J. Brockmeier, M. K. Hazrati, W. J. Freeman, and J. C. Principe, "Locating spatial patterns of waveforms during sensory perception in scalp EEG," in *IEEE Engineering in Medicine and Biology Society (EMBC)*, 2012.

A. J. Brockmeier, J. S. Choi, M. M. Emigh, J. T. Francis, and J. C. Principe, "Subspace matching thalamic microstimulation to tactile evoked potentials in rat somatosensory cortex," in *IEEE Engineering in Medicine and Biology Society (EMBC)*, 2012.

B. H. Fadlallah, **A. J. Brockmeier**, S. Seth, L. Li, A. Keil, and J. C. Príncipe, "An association framework to analyze dependence structure in time series," in *IEEE Engineering in Medicine and Biology Society (EMBC)*, 2012.

A. J. Brockmeier, B. Mahmoudi, J. C. Sanchez, and J. C. Principe, "Efficient temporal decomposition of local field potentials," in *IEEE Int. Work. Machine Learning for Signal Processing (MLSP)*, 2011.

A. J. Brockmeier, J. S. Choi, M. M. DiStasio, J. T. Francis, and J. C. Principe, "Optimizing microstimulation using a reinforcement learning framework," in *IEEE Engineering in Medicine and Biology Society (EMBC)*, 2011.

S. Craciun, **A. J. Brockmeier**, A. D. George, H. Lam, and J. C. Principe, "An information-theoretic approach to motor action decoding with a reconfigurable parallel architecture," in *IEEE Engineering in Medicine and Biology Society (EMBC)*, 2011.

S. Seth, **A. J. Brockmeier**, J. S. Choi, M. Semework, J. T. Francis, and J. C. Principe, "Evaluating dependence in spike train metric spaces," in *Int. Joint Conf. Neural Networks (IJCNN)*, 2011.

S. Seth, **A. J. Brockmeier**, and J. C. Principe, "A metric approach toward point process divergence," in *IEEE Int. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2011.

A. J. Brockmeier, E. G. Kriminger, J. C. Sanchez, and J. C. Principe, "Latent state visualization of neural firing rates," in *Int. IEEE/EMBS Conf. Neural Engineering (NER)*, 2011.

L. Li, **A. Brockmeier**, J. T. Francis, J. C. Sanchez, and J. C. Principe, "An adaptive inverse controller for online somatosensory microstimulation optimization," in *Int. IEEE/EMBS Conf. Neural Engineering (NER)*, 2011.

S. Seth, I. Park, **A. Brockmeier**, M. Semework, J. Choi, J. Francis, and J. Principe, "A novel family of non-parametric cumulative based divergences for point processes," in *Advances in Neural Information Processing Systems (NIPS)*, 2010.

A. J. Brockmeier, I. Park, B. Mahmoudi, J. C. Sanchez, and J. C. Principe, "Spatio-temporal clustering of firing rates for neural state estimation," in *IEEE Engineering in Medicine and Biology Society (EMBC)*, 2010.

Conference Abstracts

K. Nolan, S. Ananiadou, P. Przybyła, **A. J. Brockmeier**, "RobotAnalyst: An online system to support citation screening in evidence reviewing," at *Global Evidence Summit*, Cape Town, South Africa, Sept. 2017.

S. Dura-Bernal, K. Li, **A. J. Brockmeier**, C. C. Kerr, S. A. Neymotin, J. C. Principe, J. T. Francis, and W. W. Lytton, "Modulation of virtual arm trajectories via microstimulation in a spiking model of sensorimotor cortex," at *23rd Ann. Computational Neuroscience Meeting: CNS*2014*, Québec City, Canada, July 2014.

E. Kriminger, **A. Brockmeier**, L. Sanchez-Giraldo, and J. Principe. "Metric learning for invariant feature generation in reinforcement learning," at *Reinforcement Learning and Decision Making*, Princeton, New Jersey, Oct. 2013.

J. S. Choi, **A. J. Brockmeier**, M. Emigh, L. von Kraus, and J. T. Francis. "Optimizing multi-channel microstimulation pulse trains with a model-predictive controller," at *23rd Ann. Meeting of the Society for the Neural Control of Movement*, San Juan, Puerto Rico, April 2013.

E. K. Anderson, **A. J. Brockmeier**, N. G. Reyero, D. S. Barber, and N. D. Denslow. "Developing and validating a novel method for selecting class-specific biomarkers in ecotoxicology: A case study using fathead minnow microarray data," at *31st Ann. National SETAC Conf.*, Portland, Oregon, Nov. 2010.