

# Daniel J. Saunders

Machine Learning Engineer  
Fomoro AI

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## Education

M.Sc. Computer Science, University of Massachusetts, Amherst Concentration: machine learning, computational neuroscience GPA: 3.8	2017–2018
B.S. Computer Science, University of Massachusetts, Amherst Concentration: theoretical computer science, artificial intelligence GPA: 3.5	2012–2016
B.S. Mathematics, University of Massachusetts, Amherst Concentration: mathematical computing GPA: 3.5	2012–2016

## Employment

Machine Learning Engineer <i>Fomoro AI</i>	Winter 2019–
Graduate Research Assistant <i>Biologically Inspired Neural and Dynamical Systems Lab</i> Supervisor(s): Professors Robert Kozma and Hava Siegelmann	Spring 2017–Fall 2018
Data Science Intern <i>HealthcareSource</i>	Summer 2018
Programmer <i>Department of Resource Economics, University of Massachusetts, Amherst</i> Supervisor(s): Professors Christian Rojas and Debi Mohapatra	Fall 2016–Fall 2018
Research Intern <i>Air Force Research Lab Automatic Target Recognition Center</i> Supervisor(s): Dr. Roman Ilin and Professor Robert Kozma	Summer 2017
Programmer <i>Biologically Inspired Neural and Dynamical Systems Lab</i> Supervisor(s): Professor Hava Siegelmann	Summer 2016
Programmer <i>Cognition and Action Lab, University of Massachusetts, Amherst</i> Supervisor(s): Professor Rebecca Spencer	Summer 2015–Winter 2017

Software Development Intern  
Epsilon

Summer 2015

## Awards

Bay State Master's Program (50% of tuition & fees)	Spring 2017- Fall 2018
Graduate Research Fellowship	Spring 2017–Fall 2018
IJCNN 2018 - Runner-Up for Best Paper Award <i>Unsupervised Learning with Self-Organizing Spiking Neural Networks</i>	Spring 2018

## Publications

### JOURNAL ARTICLES

1. D. J. Saunders, D. Patel, H. Hazan, H. T. Siegelmann, and R. Kozma. Locally connected spiking neural networks for unsupervised feature learning. *Neural Networks*, 119:332 – 340, 2019.
2. H. Hazan, D. J. Saunders, D. T. Sanghavi, H. T. Siegelmann, and R. Kozma. Lattice map spiking neural networks (lm-snns) for clustering and classifying image data. *Annals of Mathematics and Artificial Intelligence*, pages 1 – 24, 2019.
3. D. Patel, H. Hazan, D. J. Saunders, H. T. Siegelmann, and R. Kozma. Improved robustness of reinforcement learning policies upon conversion to spiking neuronal network platforms applied to ATARI games. *CoRR*, abs/1903.11012, 2019.
4. H. Hazan, D. J. Saunders, H. Khan, D. Patel, D. T. Sanghavi, H. T. Siegelmann, and R. Kozma. Bindsnet: A machine learning-oriented spiking neural networks library in python. *Frontiers in Neuroinformatics*, 12:89, 2018.

### CONFERENCE ARTICLES

5. H. Hazan, D. J. Saunders, D. T. Sanghavi, H. T. Siegelmann, and R. Kozma. Unsupervised learning with self-organizing spiking neural networks. In *International Joint Conference on Neural Networks*, 2018.
6. D. J. Saunders, H. T. Siegelmann, R. Kozma, and M. Ruzinkó. Stdp learning of image patches with convolutional spiking neural networks. In *International Joint Conference on Neural Networks*, 2018.

### WORKING PAPERS (WORKING TITLES)

7. S. Wenke, D. Saunders, M. Qiu, and J. Fleming. Reasoning and generalization in RL: A tool use perspective. *CoRR*, abs/1907.02050, 2019.
8. S. M. de Bruyn Kops, D. J. Saunders, E. A. Rietman, and G. D. Portwood. Unsupervised Machine Learning to Teach Fluid Dynamicists to Think in 15 Dimensions. *arXiv e-prints*, page arXiv:1907.10035, Jul 2019. Submitted to *Journal of Turbulence*.
9. D. J. Saunders, C. Sigrist, K. Chaney, R. Kozma, and H. T. Siegelmann. Minibatch processing in spiking neural networks. *ArXiv*, abs/1909.02549, 2019. Submitted to *AAAI 2020*.

## Talks & Presentations

### POSTER PRESENTATIONS

1. D. J. Saunders, H. Hazan, H. Khan, H. T. Siegelmann, R. Kozma. BindsNET: An ML-oriented spiking networks library built with PyTorch. PyTorch Developers Conference 2018. San Francisco, California. October 2, 2018.

## Open Source Software

1. BindsNET: A spiking neural networks simulation library built with PyTorch  
GitHub repo: <https://github.com/Hananel-Hazan/bindsnet>  
Authors: **D. J. Saunders**, H. Hazan, and H. Khan
2. Pyoneer: Tensor utilities, reinforcement learning, and more!  
GitHub repo: <https://github.com/fomorian/pyoneer>  
Authors: Fomoro AI

## Technical Skills

- Programming languages (ordered by decreasing proficiency): Python, R, Java, C/C++, MATLAB, SQL, JavaScript
- Machine learning frameworks (ordered by decreasing proficiency): Tensorflow, PyTorch, Scikit-Learn, Keras, Theano, MatConvNet

## Relevant coursework

- Machine learning (undergraduate & graduate)
- Artificial intelligence (undergraduate & graduate)
- Deep neural networks
- Statistics I & II (undergraduate)
- Mathematical statistics I & II (graduate)
- Distributed & operating systems
- Causal inference
- Algorithms for data science
- Applied information theory
- Dynamical systems
- Computational complexity