

Sean Aubin | Systems Design

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🌐 compneuro.uwaterloo.ca/people/sean-aubin.html

Education

Academic Qualifications.....

University of Waterloo

- *MASc (Hons) Systems Design Engineering*

Started Sept. 2015

Cumulative Average: 96.00

University of Waterloo

- *Electrical Engineering, Honours, Co-op Program, with Distinction*

Sept. 2010 – Apr. 2015

Cumulative Average: 82.42

Awards.....

- **Alexander Graham Bell CGS - Master's** \$17500 - Declined (2017)
- **President's Graduate Scholarship** \$5000 - Declined (2017)
- **CogSci Conference: Computational Modeling Prize in Applied Cognition** \$1000 (2016)
- **CogSci Conference: Student Travel Award** \$500 (2016)
- **Ontario Graduate Scholarship** \$15000 (2016)
- **President's Graduate Scholarship** \$5000 (2016)
- **University of Waterloo Graduate Scholarship** \$5000 (2016)
- **NSERC Undergraduate Research Award** \$4500 (2015)
- **Dean's Honour List** Spring 2014
- **ECE457A: Cooperative and Adaptive Algorithms** Best project at poster session
- **University of Waterloo Merit Award** \$1000 (2010)

Publications.....

Aubin, S., Voelker A., and Eliasmith C., Improving with Practice: A Neural Model of Mathematical Development. *Topics in Cognitive Science*, 2016. (in press)

Aubin, S., Voelker A., and Eliasmith C., Improving with Practice: A Neural Model of Mathematical Development. *38th Annual Conference of the Cognitive Science Society*, 2016.

Sharma, S., **Aubin S.**, and Eliasmith C., Large-scale Cognitive Model Design Using the Nengo Neural Simulator. *Biologically Inspired Cognitive Architectures*, 2016.

Research Experience.....

Masters Thesis (Ongoing): 'Modeling Learning with the Tower of Hanoi Puzzle'

A model of the Tower of Hanoi puzzle has already been implemented by T. Stewart in a biologically plausible production system using the Neural Engineering Framework (NEF) and the Semantic Pointer Architecture (SPA), but with hard-coded rules. I plan to expand this model to create its own rules dynamically in a human-like manner using Reinforcement Learning with the Nengo neural simulator (github.com/nengo/nengo).

Undergraduate Research Assistant: 'Visualization of Neural Simulation Data'

While converting D. Rasmussen's Hierarchical Reinforcement Learning from Nengo 1.4 to Nengo 2.0, dynamic visualization of the state-changes happening in the model were needed. Created a web-based visualizer using D3.js and JavaScript laying the foundation for the present Nengo GUI (github.com/nengo/nengo_gui). Analyzed state-space exploration patterns of neural reinforcement learning model in response to different noise patterns being injected into the basal ganglia.

Relevant Industry Experience

Honda Research Institute Japan

Research Intern

Randy Gomez, PhD

Nov.–June. 2017

- Researching multi-modal emotion detection.

Honda Research Institute Japan

Research Intern

Kazuhiro Nakadai, PhD

May–Dec. 2013

- Built a multi-modal human-computer system under a strict deadline using Kinects, a microphone array, HARK and other technologies.
- Created a spoken language understanding module that converted text derived from speech into a machine understandable command using natural language processing.
- Used ROS, Ubuntu, Kinect and C++ to create a gaze detection and user recognition system.
- Applied software engineering principles to make an understandable and maintainable system, which is still in use today.

Extracurricular Activities

Teaching Experience.....

- **Python Workshop for Beginners** Organized and taught a two-day 14 hour workshop teaching Python to students who have never programmed before. Obtained \$500 grants from both Women in Computer Science and the Python Software Foundation.
- **Software Carpentry** Organized and taught the Git component of a two-day Software Carpentry workshop, intended to help researchers save time with better programming skills.
- **Nengo Summer School** Assisted post-docs and PhDs in constructing a model of the Wisconsin Card Sorting Task, Motor Sequencing and Classical Conditioning using Nengo over a period of two weeks.
- **First-Year Circuits and Programming Tutor** Tutored at drop-in sessions for first-year engineering students learning to solve analog circuits, as well as program in C++ and Matlab.
- **Learning Night** Co-organizer of periodic event where attendees make 15 minute casual and informative presentations, ranging from "How to Build a Brain" to "Intro to K-pop Choreography". For more information see learningnight.com

Other Activities.....

- **Kavli Summer School 2016** Participant of two week long summer school focused on brain circuits and stress in cognitive neuroscience. Hosted informal Nengo workshop.
- **Kavli Futures Symposium 2016** Attended weekend seminar on alternatives to synaptic memory storage. Suggested a Nengo-based alternative.
- **EngPlay** Participated during three theatrical productions playing both major and minor roles, such as a respected general with a darkly comedic past.
- **cogsci.stackexchange.com** Avid participant on the question/answer site. Frequently answer/ask questions about theoretical neuroscience and cognitive modeling. Also regularly carry out moderation duties, such as closing off-topic questions and helping users clarify their queries.