Sean Aubin | Systems Design

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Education

Academic Qualifications

University of Waterloo
MASc (Hons) Systems Design Engineering   *Sept. 2015 – Apr. 2018*
Cumulative Average: 93.00

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 (2018)
- **President's Graduate Scholarship** $5000 (2018)
- **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*.

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

Master's Thesis: *Neurally Modeling Improving with Practice*

Two models were created in spiking neurons using the Nengo neural simulator demonstrating the skill of improving with practice. The first modeled transition between counting and recall addition strategy. The second modeled word-pair recognition while matching MEG data. Contrasted, they provide a deeper understanding of the mechanisms behind this essential human skill.

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.

Industry Experience

Honda Research Institute Japan   **Randy Gomez, PhD**
Graduate Research Intern   *Nov.–June. 2017*

- Applied theoretical Deep Learning concepts to solve a difficult problem.
- Built Kinect joint de-noising and emotion detection neural networks using Keras and TensorFlow.

Honda Research Institute Japan   **Kazuhiro Nakadai, PhD**
Undergraduate Research Intern   *May–Dec. 2013*

- Built a multi-modal human-computer system under a strict deadline using Kinects and a microphone array.
- Created a spoken language understanding module to convert text derived from speech into a machine-understandable command using natural language processing.
- Used ROS, Kinect and C++ to create a gaze detection and user recognition system.

Extracurricular Activities

Teaching Experience

- ***Guest Lecturer*** Gave lecture in English literature course on the metaphors, levels of abstraction and mechanistic explanations for the brain. Gave lecture in Simulating Neurobiological Systems on simulating long-term and short-term memory.

- ***Python Workshop for Beginners 2016-2018*** Organized and taught a series of three-day Python programming workshops to students who have never programmed before. Obtained multiple grants from Women in Computer Science and the Python Software Foundation. `uwpyb.github.io`

- ***Nengo Summer School 2015, 2016, 2018*** Gave tutorial on biologically plausible learning rules.

- ***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.

- ***First-Year Circuits and Programming Tutor*** Tutored drop-in sessions for first-year engineering students learning to solve analog circuits, as well as C++ and Matlab programming.

- ***Learning Night*** Co-organizer and occasional presenter 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 and Futures Symposium 2016*** Participant of two week long summer school focused on brain circuits and stress in cognitive neuroscience. Hosted informal Nengo workshop. Attended weekend seminar on alternatives to synaptic memory storage.

- ***psychology.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.