Cameron Allen

csal@brown.edu
camallen.net

I am interested in the computations that enable intelligence. My research goal is to improve the intelligence of machines so they can more effectively provide safe, ethical guidance and service to humans. To that end, I engage in both theoretical and experimental research in reinforcement learning, modeling, abstraction, exploration, and value alignment.

Brown University May 2021 *(Expected)*
Ph.D. Candidate, Computer Science
Advisor: Prof. George Konidaris

Duke University 2015 - 2016 *(Transferred)*
Ph.D. Candidate, Computer Science
Advisor: Prof. George Konidaris

Tufts University May 2011
B.S. Electrical Engineering, *Summa Cum Laude*
Advisors: Prof. Ron Lasser, Prof. Eric Miller

Research Projects

Mean Actor-Critic – (2017, ArXiv paper, unpublished)

Cameron Allen*, Kavosh Asadi*, Mel Roderick, Abdel-rahman Mohamed, George Konidaris, Michael Littman
https://arxiv.org/abs/1709.00503

Abstract: We propose a new algorithm, Mean Actor-Critic (MAC), for discrete-action continuous-state reinforcement learning. MAC is a policy gradient algorithm that uses the agent's explicit representation of all action values to estimate the gradient of the policy, rather than using only the actions that were actually executed. We prove that this approach reduces variance in the policy gradient estimate relative to traditional actor-critic methods. We show empirical results on two control domains and on six Atari games, where MAC is competitive with state-of-the-art policy search algorithms.

High-Throughput Viterbi Decoder – (2012 - 2013)

http://camallen.net/files/viterbi.pdf

- Created a parallelized VHDL implementation of a Viterbi decoder, which allowed for arbitrarily high data throughput.
- Code was used as part of a reference implementation for a government communications system.

Anomaly Detection in X-ray Backscatter Leg Images – (2010 - 2011)

http://camallen.net/files/grc-anomaly-detection.pdf

- Designed and implemented a threat detection algorithm in MATLAB using image processing and machine learning techniques, which had a 97% detection rate and less than 5% false alarm rate for a test set of real and simulated threats in airport X-ray scanner images.
- Presented results to an audience of ~100 people at 2011 Gordon Research Conference in Italy.

Memristor Simulator – (2010 - 2011, Capstone project)

http://camallen.net/files/memristor-report.pdf

- Wrote an open-source modification of the SPICE circuit simulator that enabled modeling of memristor circuit components and which has been downloaded hundreds of times.

camallen.net Cameron Allen csal@brown.edu

Professional Experience

The MITRE Corporation

Senior Software Engineer May 2013 - Jul 2015
Communications Engineer Jul 2011 - May 2013

- Led software design, algorithm development, and implementation of a self-optimizing mesh network of custom, software-defined UHF radios.
- Demonstrated prototype radios to NATO representatives, and successfully persuaded UK MoD to propose adding the technology to the next SATURN specification revision, which would result in up to 15 times the range and 40 times the data throughput of previous-generation radios.
- Designed and wrote software (C++, Python, Java) and firmware (VHDL) for a variety of government communications systems.

American Science & Engineering

Research Co-op, Image Processing May 2010 - Aug 2010

- Researched state-of-the-art image processing techniques for denoising, segmentation, alignment, registration, warping, and filtering.
- Designed and wrote a machine learning algorithm for anomaly detection in MATLAB, which incorporated several open-source image processing libraries.

Tufts University – Child & Family WebGuide

Lead Web Developer Sep 2009 - May 2011
Web Developer Sep 2007 - Aug 2009

- Created and maintained front-end and back-end web software for a curated collection of child development resources.
- Led four-person team through substantial site redesign while maintaining 10-15K visitors per month.

Teaching Experience

Brown University

- Guest Instructor, Reintegrating AI, with Prof. George Konidaris

Duke University

- Guest Instructor, Artificial Intelligence, with Prof. George Konidaris

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Invited Talks

- **The Memristor Project: Simulation Software for a New Analog Circuit Device**
  Technology Innovation Series, American Science & Engineering; Billerica, MA. Sept. 2011.
- **Anomaly Detection in X-ray Backscatter Leg Images Using Machine Learning**
  Gordon Research Conference on Detecting Illicit Substances; Lucca, Italy. June 2011.