Cameron Allen

Curriculum Vitae

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Education

Brown University
Ph.D. in Computer Science *2023*
Advisor: George D. Konidaris

M.S. in Computer Science *2018*
Advisor: George D. Konidaris

Tufts University
B.S. in Electrical Engineering, *Summa Cum Laude* *2011*
Advisors: Ronald Lasser, Eric L. Miller

Professional Experience

UC Berkeley **Berkeley, CA**
Postdoctoral Scholar, advised by Stuart Russell *Sept. 2023–present*

IBM Research **Yorktown Heights, NY**
Research Intern, mentored by Gerald Tesauro *Summer 2019*

- Investigated novel skill-learning techniques to improve the computational efficiency of reinforcement learning and planning.

The MITRE Corporation **Bedford, MA**
Senior Software Engineer *2013–2015*

Communications Engineer *2011–2013*

- 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 **Billerica, MA**
Research Intern, mentored by Eric L. Miller & Omar Al-Kofahi *Summer 2010*

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

Teaching Experience

Co-Instructor
Machine Learning Workshop, *3 days, 25 students*, Woods Hole Oceanographic Institution – *Fall 2019*

Guest Lecturer
Artificial Intelligence (CSCI 1410), *2 lectures, 145 students*, Brown University – *Fall 2019*
Reintegrating AI (CSCI 2951-X), *2 lectures, 35 students*, Brown University – *Spring 2018*
Artificial Intelligence (CPS 270), *1 lecture, 100 students*, Duke University – *Spring 2016*

Teaching Assistant
Learning and Sequential Decision Making (CSCI 2951-F), *85 students*, Brown University – *Fall 2019*
Artificial Intelligence (CPS 270), *100 students*, Duke University – *Spring 2016*

Invited Talks

Apr. 2023: UC Berkeley
Apr. 2023: Stanford
Mar. 2023: Harvard
Feb. 2023: Northeastern University
Jan. 2023: IBM Neuro-Symbolic AI Workshop
Nov. 2022: UMass Amherst
Nov. 2022: Duke University
Mar. 2021: Oxford
Feb. 2021: Arizona State University
Sep. 2011: American Science & Engineering
Jun. 2011: Gordon Research Conference on Detecting Illicit Substances

Awards

2014: Awarded MITRE Director's Award for engineering excellence
2011: Awarded merit-based Amos Emerson Dolbear Scholarship in Electrical Engineering
2010: Awarded merit-based Howard Sample Prize Scholarship in Physics

Publications

Structured Abstractions for General-Purpose Decision Making **2023**
C. Allen
PhD Thesis, October 2023. [PDF]

Resolving Partial Observability in Decision Processes via the Lambda Discrepancy **2023**
C. Allen, A. Kirtland, R. Y. Tao, D. Scott, S. Lobel, N. Petrocelli, O. Gottesman, M. Littman, G. Konidaris
Under review at the *International Conference on Learning Representations*, September 2023.

Task Scoping: Generating Task-Specific Simplifications of Open-Scope Planning Problems **2023**
M. Fishman*, N. Kumar*, C. Allen, N. Danas, M. Littman, S. Tellex, and G. Konidaris
At the *IJCAI Workshop on Bridging the Gap Between AI Planning and Reinforcement Learning*, August 2023. [PDF]

Coarse-Grained Smoothness for Reinforcement Learning in Metric Spaces **2023**
O. Gottesman, K. Asadi, C. Allen, S. Lobel, G. Konidaris, and M. Littman
In *Proceedings of the 26th International Conference on Artificial Intelligence and Statistics*, April 2023. [PDF]

Characterizing the Action-Generalization Gap in Deep Q-Learning **2022**
P. Zhou, C. Allen, K. Asadi, and G. Konidaris
In the *5th Multidisciplinary Conference on Reinforcement Learning and Decision Making*, June 2022. [PDF] [Code]

Optimistic Initialization for Exploration in Continuous Control **2022**
S. Lobel, O. Gottesman, C. Allen, A. Bagaria, and G. Konidaris
In *Proceedings of the Thirty-Sixth AAAI Conference on Artificial Intelligence*, February 2022. [PDF] [Code]

Learning Markov State Abstractions for Deep Reinforcement Learning **2021**
C. Allen, N. Parikh, O. Gottesman, and G. Konidaris
In *Advances in Neural Information Processing Systems 34*, December 2021. [PDF] [Code]
Also at the *NeurIPS Deep Reinforcement Learning Workshop*, December 2020. [PDF]

Efficient Black-Box Planning Using Macro-Actions with Focused Effects **2021**
C. Allen, M. Katz, T. Klinger, G. Konidaris, M. Riemer, and G. Tesauro
In *Proceedings of the 30th International Joint Conference on Artificial Intelligence*, August 2021. [PDF] [Code]
Also at the *ICAPS Workshop on Heuristics and Search for Domain-independent Planning*, August 2021. [PDF]

Bad-Policy Density: A Measure of Reinforcement Learning Hardness **2021**
D. Abel, C. Allen, D. Arumugam, D. E. Hershkowitz, M. Littman, and L. L. S. Wong
In the *ICML Workshop on Reinforcement Learning Theory*, July 2021. [PDF]

Mean Actor-Critic **2017**
C. Allen*, K. Asadi*, M. Roderick, A. Mohamed, G. Konidaris, and M. Littman
arXiv:1709.00503 [stat.ML], September 2017. [PDF]

Software Packages

Onager [Code] **2020**
Cameron Allen, Neev Parikh
A lightweight Python library for launching experiments and tuning hyperparameters, either locally or on a cluster.

Other Projects

High-Throughput Viterbi Decoder **2013**
Presentation [PDF] and software package (proprietary)

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

Anomaly Detection in X-ray Backscatter Leg Images **2011**
Presentation [PDF] and software package (proprietary)

- 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 as an invited speaker at the 2011 Gordon Research Conference in Lucca, Italy.

Memristor Simulator **2011**
Capstone project [PDF] [Code]

- 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.

Professional Service

Organizing Committee: ICAPS & IJCAI workshops on Planning and RL (PRL), 2023

Journal Reviewing: JMLR 2023; NCAA 2022

Conference Reviewing: ICLR 2022-2023; ICML 2023; NeurIPS 2022; AAAI 2021

Workshop Reviewing: GenPlan@NeurIPS 2023

Departmental Service

Brown University, Computer Science

- High-Performance Computing Merc, 2018–2022
- New PhD student mentor, 2018–2022
- Organized department technical writing workshop, 2021
- Organized and led department-wide code review group, 2020–2021
- Graduate Student Council representative, 2018–2019