

Shane Parr

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Education

Brown University

PHD IN COMPUTER SCIENCE

Providence, RI

Sept. 2021-present

- Studying Artificial Intelligence under George Konidaris.
- Research interests include a broad mix of model-based reinforcement learning, hierarchical reinforcement learning, abstractions, partial observability, and a little bit of theory of mind.

University of Massachusetts Amherst

B.S. IN COMPUTER SCIENCE

Amherst, MA

Sept. 2016 - May. 2020

- Earned a course citation for being among the top ten students out of 170 in CS 250 (Introduction to Computation)
- Was an **Undergraduate Course Assistant** for CS 250, with duties that included aiding with discussions, answering student questions, and grading proof-heavy problem sets.

Featured Publications

Agent-Aware State Estimation in Autonomous Vehicles

S. PARR, I. KHATRI, J. SVEGLIATO, AND S. ZILBERSTEIN

to appear in IROS 2021

University of Massachusetts Amherst

Planning with Abstract Learned Models While Learning Transferable Subtasks

J. WINDER, S. MILANI, M. LANDEN, E. OH, S. PARR, *et al.*

AAAI 2020

UMBC

Experience

Intelligent Robot Lab at Brown University

GRADUATE RESEARCH ASSISTANT

Providence, RI

July 2021 - present

- Advised by George Konidaris, extending my prior work on **intra-model learning** to tackle **hard exploration** problems like Montezuma's Revenge.
- Researching **skills to symbols** and exploring the possibilities for future extensions to **partially observable** problems.
- Assisting with a **lifelong reinforcement learning** project.

Amplio.ai

SENIOR MACHINE LEARNING ENGINEER

Chantilly, VA (remote)

June 2020 - May 2021

- **Lead a team** of machine learning and computer vision engineers to execute on a variety of challenging problems and designed multiple **computer vision products** for amplifying human performance from video, with the help of USC Professor Wael Abd-Almageed.
- Read papers on, implemented, and trained custom **bi-recurrent neural networks**, CNNs, as well as used architectures including **YOLOv3**, **OpenPose**, and **VGG** to process hundreds of thousands of frames from exercise and basketball footage.
- Created job postings and **gave technical interviews** to applicants; we **hired two computer vision engineers and a data engineer**.

Resource-Bounded Reasoning Lab at University of Massachusetts Amherst

UNDERGRADUATE RESEARCHER

Amherst, MA

September 2019 - October 2020

- Under Shlomo Zilberstein. Posed the problem of **agent-aware state estimation (AASE)**, which asks how a neutral observer can improve state estimation in a **cooperative partially observable multi-agent domain** by leveraging models of participating agents.
- Applied a new inference algorithm to **self-driving car traffic light estimation** during temporally extended visual obstructions, and determined that framing it as an AASE problem allows for **accurate estimates of the light even under severe signal degradation**.

FireEye

DATA SCIENCE INTERN

Reston, VA

May-August 2019

- Under Jeff Johns, worked alongside PhD candidate data science interns as an undergrad on a challenging solo research project to **plan under uncertainty and partial observability** to detect and defeat **advanced persistent threat actors**.
- Devoured an intensive literature review, grounded theoretical models to be compatible with industry standard tools and human values, and implemented a **proof of concept defense AI**.

Multi-Agent Planning and Learning Lab at UMBC

Baltimore, MD

RESEARCH ASSISTANT

Summers 2016, 2017, 2018

- Developed novel **model-based hierarchical reinforcement learning** strategies using the Abstract Markov Decision Process (AMDP) framework as a research assistant with Prof. Marie desJardins.
- Refined the lab approach to include task-specific state abstraction and developed the idea of **intra-model learning**, improving sample-efficiency.
- Explored the concept of replanning, allowing the algorithms to dynamically break out of hierarchical confines in order to improve performance.

Tools

Proficient Python, Pytorch, TensorFlow, Keras, Java, BURLAP, NumPy, Pandas, Git, Matplotlib, \LaTeX
Experience with C/C++, R, SQL, Bash, Unix

Course Projects

Region Proposal Networks for Named Entity Recognition

Amherst, MA

NATURAL LANGUAGE PROCESSING

September-December 2019

- Designed, implemented and trained Convolutional Neural Networks for Named Entity Recognition.
- Developed novel 1-dimensional region proposal technique, and wrote 10 page paper.
- Tools used: Python, Tensorflow 2.0, Keras, NumPy, Git, Pytorch

2-Dimensional Total Variational Denoising via Alternating Direction Method of Multipliers

Amherst, MA

NUMERICAL OPTIMIZATION

September-December 2019

- Implemented ADMM in order to denoise images.
- Mathematically manipulated the problem into three separate sub-problems, solved two via projected gradient descent and solved one analytically
- Denoised an image of a banana, and reported on results.
- Tools used: Python, Google Colab, NumPy

Personal Projects

Zorrofish, an AlphaZero-style Chess Engine using the Stockfish code base

Amherst, MA

CHESS COMPUTER

September 2017 - present

- Reused existing code from the open source chess computer world champion Stockfish.
- implemented Monte Carlo Tree Search from scratch and read the AlphaGo Zero paper to understand the neural architecture behind AlphaZero.
- Tools used: C++, Python, Tensorflow, NumPy, Git

Clarifaiku: Using Clarifai and RNNs to write haikus inspired by images

Amherst, MA

HACKUMASS IV

November 2016

- Attempted ambitious HackUmass project to use Recurrent Neural Networks to generate Haikus from images.
- Tools used: Python, Git, Django, Tensorflow

Presentations

HackUmass VI NVIDIA Deep Learning Course

Amherst, MA

LEAD PRESENTER

November 2019

- Lead the NVIDIA sponsored Deep Learning course on computer vision.
- Presented to over 40 participants, and designed and lead exercises to teach the value of convolutional architectures and fine-tuned models.

Natural Language Processing Poster

Amherst, MA

GROUP MEMBER

December 2019

- Gave a poster presentation in front of industry affiliates and our Natural Language Processing class.
- Presented in a room with 200+ participants, explaining our novel architecture and preliminary results.

FireEye Intern Poster

Reston, VA

DATA SCIENCE INTERN

August 2019

- Gave an internal poster presentation on the AI research done over the summer to a diverse audience, including executives.