Steven Carr

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Postdoctoral artificial intelligence researcher at the Oden Institute for Computational Engineering and Sciences within UT Austin. My research focus is on the intersection of reinforcement learning and formal methods for autonomous systems. Looking for exciting opportunities in providing assurances for emerging artificial intelligence research for decision-making.

Education

The University of Texas at Austin 2016 – 2022
Doctor of Philosophy (Aerospace Engineering) - Task-Aware Planning and Learning in Partially Observable Environments
Subject Areas: Autonomous Systems, Artificial Intelligence, Robotics, Formal Methods, Reinforcement Learning
Master of Science Engineering (Aerospace Engineering) | Coursework: Machine Learning, Game Theory, Optimal Control

The University of Sydney 2010 – 2014
Bachelor of Engineering (Aeronautical Space)/ Bachelor of Science (Advanced Mathematics/Physics) Honours I
Coursework: Aircraft Systems, Aircraft Design, Astrophysics, Mathematics (Advanced) | Graduated with Distinction

Recent Academic Papers

Safe Reinforcement Learning via Shielding for POMDPs. AAAI 2023 2023
Dynamic Certification for Autonomous Systems 2022
Task-aware Verifiable RNN-based Policies for Partially Observable Markov Decision Processes. JAIR 72: 819-847. 2021
Decentralized Classification with Assume-Guarantee Planning. Intelligent Robots and Systems (IROS). 2021
Safe Policies for Factored Partially Observable Stochastic Games. Robotics: Science and Systems (RSS). 2021

Professional Experience

Oden Institute for Computational Engineering and Sciences - *Postdoctoral Fellow* 2022-2023
◇ Coordinated research teams on emerging applications in autonomy with an emphasis on assured reinforcement learning.
◇ Researched model-based improvements to ensuring safety while learning in policy gradient methods (PPO, SAC).

Mutli AI - *Artificial Intelligence Research Consultant* 2022-2023
◇ Designed formal models and crafted solutions (using constrained MCTS) for autonomous decision-making with adversaries.

The University of Texas at Austin - *Graduate Research Assistant* 2016-2022
◇ Published and presented numerous academic research papers on topics in machine learning, controls and robotics.
◇ Modified machine learning libraries (Tensorflow and PyTorch) to formally verify an agent controlled by an RNN.

Skygrid - *Applied Research Intern* 2018
◇ Designed and implemented an information sharing algorithm for a team of UAV agents to provably converge to a consensus.
◇ Modified a D* algorithm to build a scalable multi-agent path planning solution for air traffic management.

The University of Texas at Austin - *Teaching Assistant for ASE 361K/361L Aircraft Design I/II* 2016-2018
◇ Taught a systems engineering-based approach for designing, building, flight testing a UAV to meet mission requirements.
◇ Lectured undergraduate students on UAV control systems and implementing a ground control/autopilot using Ardupilot Mission Planner with specific instruction on tuning for hardware-in-the-loop controllers.

Department of Defence (Australia) - *Technology Analyst* 2015-2016
◇ Utilized engineering, physics and mathematical skills to create technical assessments for government decision-makers.
◇ Collaborated with Five Eyes Defense partners to produce concept documents for future defense capabilities.

Australian Centre for Field Robotics (ACFR) - *Optimization Researcher* 2014-2015
◇ Explored path planning for multiple robotic agents in a stochastic environment, using optimization methods.
◇ Participated in a team environment to develop a simulation process for UAVs using Python.

Silicon Controls - *Systems Engineer (2013-2014) and Hardware Tester (2011-2013)* 2011-2014
◇ Applied Bayesian statistics principles to detect faulty units information from large data sets using SQL.

Skills & Interests

Technical Skills Python, C++, Tensorflow, PyTorch LaTeX, Robotic Operating System (ROS), TensorRT, CUDA
Software Libraries Learning (OpenAI Gym, Gymnasium, JAX, Stable Baselines) | Formal Methods (PRISM, storm)

References

Ufuk Topcu Professor, Department of Aerospace Engineering and Engineering Mechanics, UT Austin [utopcu@utexas.edu]
Suda Bharadwaj Head of Research and Development, Skygrid [sbharadwaj@skygrid.com]
Nils Jansen Associate Professor, Department of Software Science (SWS), Radboud University Nijmegen [n.jansen@science.ru.nl]