Pat Callaghan
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Education

Carnegie Mellon University, *Pittsburgh, PA* 2023 (expected)
Master's of Science in Robotics
Relevant coursework: Intro to machine learning, Math fundamentals for robotics, AI for manipulation, Human-robot interaction

University of Pittsburgh & Community College of Allegheny County *Pittsburgh, PA* 2021
Coursework toward BS in Computer science/engineering
Relevant coursework: Probability; Algorithms; Data structures; Calculus III; Differential equations; Linear algebra; Theory of computation; Discrete math; Numerical analysis 1, 2; Physics 1, 2, 3

University of Virginia, *Charlottesville, VA* 2016
BA in English and Economics (double major)

Research experience

Learning skills and human preferences from various interaction types November '21-Present
Humans and Robot Partners Lab; Intelligent Autonomous Manipulation Lab, Carnegie Mellon University
Co-Advisors: Profs. Henny Admoni & Oliver Kroemer

- Using information gain to model and actively select among various forms of human-provided feedback.
- Studying novel means of learning human reward functions through various interaction types, including demonstrations, preference queries, corrections, and binary critiques
- Implemented domains in which our method was compared against various baselines
- Collected and analyzed various performance data in simulation

MoonRanger September '19-December '20
Field Robotics Center, Carnegie Mellon University
Principal Investigators: Profs. Red Whittaker & David Wettergreen

- Student-lead of software team (May-August '20)
- Planning and navigation sub-team lead (September '19-August '20)
- Helped develop local motion-planning software using motion primitives, forward simulation, and cost-reward trade-offs
- Led field tests of rover mapping, planning, and navigation
- Analyzed stereo and navigation data from simulated and real-world autonomous traversals
- Developed ROS/C++ global-to-local planning and navigation prototype
- Spent 7 days in Utah's remote West Desert collecting data for novel methods of 3D modeling of lunar pits

CubeRover December '18-December 2019
Field Robotics Center, Carnegie Mellon University
Principal Investigator: Prof. Red Whittaker

- Led systems-engineering efforts of avionics documentation, coordination, fault analysis, and software/hardware implementations
- Assisted in physical testing for wheel actuation and grouser efficiency

Electrical Engineering REU May 2019-July 2019
Wireless Institute, University of Notre Dame
Principal Investigator: Prof. Thomas Pratt

- Researched novel conceptualization of dual-polarized monopulse radar for target-acquisition and radar-jamming countermeasures
- Conceived, implemented, and built upon original models of monopulse radar and target-acquisition with various environmental constraints

- Conducted literature reviews to confirm methodological approach, to identify appropriate algorithms for creating accurate simulations, and to uncover comparable research
- Synthesized radar signal-processing data between MATLAB and FEKO software packages

Publications

Fitzgerald, Tesca, P. Koppol, **P. Callaghan**, R. Wong, R. Simmons, O. Kroemer, H. Admoni. INQUIRE: Interactive Querying for User-aware Informative Reasoning. *6th Conference on Robot Learning.* 2022.

Ford, Jordan A., **P. Callaghan**, U. Wong, H. Jones, W. C. Whittaker, W. L. Whittaker. Image and Lidar Dataset of the West Desert Sinkhole: An Analog for Steep-walled Planetary Pits. *3rd International Planetary Caves Conference*. 2020.

Honors, awards, & presentations

MoonRanger/NASA Preliminary Design Review (PDR) presenter	Summer 2020
Presented poster at Notre Dame Undergraduate Research Symposium	Summer 2019
1 of 2 research projects selected to present at annual CCAC Honors forum	Spring 2019
Allegheny County Council Endowed Scholarship	Fall 2019
NASA Community College Aerospace Scholar	Fall 2018-Spring 2019
Daniel B. Krochmal Endowed Scholarship	Spring 2019
Culver Academies Teaching Fellowship	2017-18
Salisbury University Presidential Scholarship	2012-13