Peter Mitrano - Curriculum Vitae/Resume

EDUCATION

PhD. Robotics
University of Michigan, expected May 2023

MS. Robotics
University of Michigan, May 2020

BS. Computer Science, *BS.* Robotics Engineering
Worcester Polytechnic Institute, May 2018
3.95 GPA
Relevant Coursework includes *Unified Robotics, Intro to AI, Deep Neural Networks, Software Engineering, Controls, Probability, Linear Algebra, Numerical Methods*

PUBLICATIONS

P. Mitrano, D. M^{c}Conachie, D. Berenson. (2020). Learning Where to Trust Unreliable Models in an Unstructured World for Deformable Object Manipulation. (Under Review) Science Robotics.

D. M^{c}Conachie, T. Power, P. Mitrano, D. Berenson. (2020). Learning When to Trust a Dynamics Model for Planning in Reduced State Spaces. ICRA/RA-L 2020.

P. Mitrano, J. Burklund, M. Giancola, C. Pinciroli (2019). A Minimalistic Approach to Segregation in Robot Swarms. The 2nd IEEE International Symposium on Multi-Robot and Multi-Agent Systems.

P. Mitrano, A. Lockman, J. Honicker, S. Barton. (2017). Using Recurrent Neural Networks to Judge Fitness in Musical Genetic Algorithms. The 5th International Workshop on Musical Metacreation (MUME).

PRESENTATIONS

Presented "Using Recurrent Neural Networks to Judge Fitness in Musical Genetic Algorithms" at the MuMe 2017 Workshop.

EMPLOYMENT

Uber ATG Pittsburgh Summer 2017, Summer 2018
My team worked on predicting the future paths of actors seen by the autonomous vehicle. I made both software engineering and algorithmic contributions.

Robot Autonomy and Interactive Learning Lab (Georgia Tech) Summer 2016
I conducted research on applying Learning from Demonstration techniques to the ROS Navigation stack. I developed several plugins for the ROS navigation stack, and studied basic machine learning and LfD techniques. My approach consisted of learning to adjust the cost map of the environment using demonstrated trajectories. These demonstrations came from a remote human operator when the robot planner failed. This work was funded by an NSF grant, and completed under the advisement of Professor Sonia Chernova.

OSRF (Open Source Robotics Foundation) Summer 2015
The aim of my project was to allow FIRST Robotics Teams to use the Gazebo robot

simulator to simulate their robots and practice programming. This project involved cross-architecture and cross-platform C++/Java development.

Robot Autonomy and Interactive Learning Lab (WPI) 2013-14
Developed 3D models and an online interface to allow online crowd-control of our robot for user studies. The goal was to learn whether online crowd-learning can be used to learn tasks in unstructured robot domains like the home. This was completed under PhD student Russell Toris, under the advisement of Professor Sonia Chernova.

VOLUNTEERING & OUTREACH

Robotics Graduate Student Outreach 2019-Present
I have served as both Social chair and Colloquium chair. I participated in several outreach events for local girl scout troops and middle schools, including hand-on engineering activities and lab tours. I have also organized colloquiums for UM Robotics students to share and discuss their research.

Rho Beta Epsilon Honor Society 2016-2018
Provided tutoring to undergraduate Robotics Engineering majors as a part of Rho Beta Epsilon Robotics Engineering Honor Society.

WPILib & FRCSim 2014-15
WPILib is a set of libraries, toolchains, and development tools that allows students in FRC to program their robots. Over 40,000 students use this software every year.

PROJECTS

Learning and Planning with Unreliable Models for Deformable Object Manipulation 2018-present
During my PhD, I have studied motion planning and deep learning and have applied these methods to deformable object manipulation. Deformable objects are challenging to model, and having poor models makes perception, planning, and control more difficult. I have explored using deep learning to model only partial dynamics of these objects and developed planning methods for this setting.

A Minimalistic Approach to Segregation in Robot Swarms 2018
Submitted to ICRA 2019. We present a decentralized algorithm to achieve segregation into an arbitrary number of groups with swarms of autonomous robots. The structure of the control system is purely reactive, and it maps directly the sensor readings to the wheel speeds with a simple if statement. We present a thorough analysis of the parameter space that enables this behavior to emerge, along with conditions for guaranteed convergence and a study of non-ideal aspects in the robot design

Perceptual Grouping in Music 2017-2018
The goal of this research is to produce a computational model for how humans perceive groupings of sonic events in music. This work consists of both psychological experiments and machine learning. We expect to publish later this year both on the ability of our model to accurately predict perceptual grouping and on the results of our psychological studies.

Position Hallucination and Indoor Localization (PHIL) 2017-2018
Senior capstone project. The goal of this project is to develop a flexible system for localization of robots for the FIRST Robotics Competition. We intend to support various sensor suites and provide precise location of the robot independent of the geometry of the available space.

WPI Smartmouse 2013-present

Smartmouse is a project organized by the WPI CollabLab to design, fabricate, and program a small maze solving robot. Our robot is capable of reaching the center of the maze in under 50 seconds, which requires precise planning and controls to be carried out at 500Hz.