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Gabriel Margolis

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Education

Massachusetts Institute of Technology (MIT) Cambridge, MA
Candidate for M.Eng. Electrical Engineering and Computer Science, GPA: 5.0/5.0 May 2021

- Coursework: Sensorimotor Learning, Algorithms for Inference, Embodied Intelligence, Cognitive Robotics

B.S. Electrical Engineering and Computer Science and May 2020
B.S. Aerospace Engineering , GPA: 5.0/5.0

- Coursework: Robotics: Science and Systems, Computational Cognitive Science, Robust Nonlinear Planning, Feedback Control Systems, Networks, Game Theory, Machine Learning, Fluid Mechanics, Thermodynamics

Experience – Research

Embodied Intelligence Group, MIT CSAIL Cambridge, MA
Graduate Research Assistant Feb 2020-Present

- Leading investigation of vision-aware highly dynamic locomotion control for Mini Cheetah quadruped robot
- Implemented control and learning algorithms for simulation and real deployment in custom built testbed

Earth Signals and Systems Group, MIT EAPS Cambridge, MA
Undergraduate Researcher Apr 2019-May 2020

- Investigated particle-based method for weight uncertainty quantification in neural networks
- Studied behavior of Hamiltonian Monte Carlo sampling in application to weather system prediction

Model-based Embedded and Robotic Systems Group, MIT CSAIL Cambridge, MA
Undergraduate Researcher Feb 2018-May 2019

- Developed active information-gathering system for UAVs in selective year-long research program
- Designed and integrated web command and control interface for high-efficiency AUV

Future Urban Mobility Laboratory, Singapore-MIT Alliance for Research and Tech Singapore, Singapore
Research Assistant May-July 2017

- Collaborated with a team of graduate students developing data-informed urban planning web services
- Deployed features for filtering a large database of geospatial data using Java, SQL, REST

Experience – Teaching

Principles of Autonomy and Decision Making, MIT Course Staff Cambridge, MA
Teaching Assistant Sept 2020-Present

- Introduced students to search, optimization, inference, and planning through lectures and programming labs
- Engaged undergraduate and graduate students in recitations, office hours, & asynchronous content

Introduction to Autonomous Machines, MIT Course Staff Cambridge, MA
Content Advisor Sept 2020-Present

- Seminar course introduces second-year undergraduates to robotics through hands-on experience
- Developed a series of exploration modules to illuminate the history and landscape of the robotics community

Robotics: Science and Systems, MIT Course Staff Cambridge, MA
Laboratory Assistant Jan 2020-May 2020

- Prepared, supported, and graded labs guiding student development of autonomous driving software stack
- Contributed to rapid simulation development following move online, culminating in first ever virtual RSS race

Experience - Industry

General Motors Detroit, MI
Autonomous Vehicle Engineering Intern June-August 2019

- Automated 40 hours/month of AV sensor alignment verification work with software tool
- Researched and implemented motion compensation algorithms for emerging event-based sensor technology

MITRE Corporation Bedford, MA
Positioning, Navigation, and Timing Intern June-August 2018

- Developed MATLAB simulation of integrated aircraft control, dynamics, and state estimation system
- Presented to department on aircraft autopilot response to faulty GPS measurement data

Projects

Drone-based Construction Site Surveillance Jan-May 2020

- Led development of algorithm for efficient surface imaging under dynamical and geometric constraints
- Team accomplished complete integrated system with shift to simulation environment due to COVID-19

Communication Inference as Inverse Planning Sept-Dec 2019

- Replicated existing results on Bayesian inference of agent goals via inverted planning model
- Extended inference algorithm and human study to a multi-agent environment with communication

Robust AUV Imaging via Sum-of-Squares Programming Sept-Dec 2019

- Implemented nonlinear planning algorithm for robust object avoidance using Sum of Squares Programming
- Demonstrated novel application of method to robustly image a target in a cluttered, uncertain environment

Monte Carlo Tree Search for Multi-agent Collaboration Feb-May 2019

- Delivered an advanced lecture and designed a problem set for graduate-level Cognitive Robotics class
- Implemented Hierarchical MCTS for asymmetric collaboration between mothership and tethered AUV

Autonomous Vehicle Racing Feb-May 2019

- Implemented control, perception, localization, planning, visual navigation in ROS, OpenCV, Git, TensorFlow
- Team took 1st place of 20 entries in annual MIT autonomous vehicle race

Hierarchical Deep Reinforcement Learning Feb-May 2019

- Replicated results from 2016 paper using Python and Tensorflow, released implementation on GitHub
- Additional experiments explored the effects of sparsity and observability in temporal abstraction

Leadership and Activities

Tau Beta Pi Engineering Honor Society *Chair of Committee Awarding $40k in Service Fellowships (2019-20)*
Lightweight Men's Rowing *High School Team Captain (2015-16), Division 1 Collegiate Athlete (2016-20)*
Kappa Sigma Fraternity *President (2019), Treasurer (2018-19), Philanthropy Chair (2017-18)*
MIT Office of the First Year *Associate Advisor, Orientation Leader (2018-19)*

Skills & Interests

Robotics, Locomotion, Perception, Planning | Python, C++ | ROS, Torch, TensorFlow, OpenCV, Git