

# ROBERT DYRO

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## EDUCATION

### Stanford University

PhD in Aeronautics & Astronautics Engineering, GPA 3.92

MS in Aeronautics & Astronautics Engineering, GPA 3.89

### University of California, Los Angeles

BS in Aerospace Engineering, Minor in Philosophy, GPA 3.94, Summa Cum Laude

Stanford, CA

2020 - present

2018 - 2020

Los Angeles, CA

2014 - 2018

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## RELEVANT COURSEWORK

Convex Optimization I & II ■ Reinforcement Learning ■ Meta-Learning ■ Large-scale Matrix Computations  
CS 1, 2 & 3 ■ Principles of Robot Autonomy ■ Optimal and Learning-based Control ■ Decision Making under Uncertainty

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## EXPERIENCE

### Graduate Student, Autonomous Systems Laboratory (ASL) at Stanford University

Stanford, CA

Second-Order Sensitivity Analysis for Bilevel Optimization

2021

- derived 2nd order sensitivity analysis of optimization, enabling much faster optimization of bilevel/inverse/sensitivity problems
- experimentally verified the new method on hyperparameter tuning and inverse control problems

Control under Arbitrary Uncertainty using Particle Model Predictive Control

2020

- implemented and experimentally evaluated consensus control particle MPC for arbitrary uncertainty representation
- developed an efficient implementation using parallelized Alternating Direction of Multipliers (ADMM) consensus optimization
- derived hierarchical control using local feedback and cost-to-go estimates via sensitivity analysis for real-time control

Convex Last-layer Meta-learning for Behavior & Physics-based Modeling

2019

- developed an extension of last layer meta-learning to generalized convex losses via optimization sensitivity analysis
- incorporated constraints into the meta-learning model for structured learning to allow adding a priori modeling knowledge

### PhD Intern, Cruise

San Francisco, CA

Deep Learning Optimization

June - September 2022

### Research Intern, Toyota Research Institute

Los Altos, CA

Intelligent Driver Behavior Modeling using Human Interpretable Rules

June - September 2020

- applied sensitivity analysis using PyTorch for inverse optimal control on nonlinear model predictive control optimization
- implemented nonlinear path planning optimization using sequential quadratic programming (SQP) in PyTorch
- embedded human logic within optimization using Signal Temporal Logic (STL) to capture human-interpretable specifications

### Student Researcher, TANMS at UCLA

Los Angeles, CA

Simulating Multi-Physics Dynamics in Computational Multiferroic Systems

2017

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## TECHNICAL EXPERIENCE

### Projects:

- developed a custom graph autodifferentiation library for full sparse 1st & 2nd order matrix derivatives
- performed large scale parametric evaluation of stochastic control work on a high performance computing (HPC) cluster
- developed sparse linear algebra sketching techniques in PyTorch for large data-computationally efficient regression
- experimentally evaluated and developed computational efficiency improvements to lifted NNs, convex reformulation of deep NNs
- implemented a gain-scheduling controller for constraining a quadrotor to a plane in C++ ROS
- implemented optimal driving and intersection collision avoidance via Monte Carlo Tree Search for partially observable planning
- developed a drone controller using model-free policy optimization reinforcement learning in TensorFlow using neural networks
- designed and operated a remotely managed electrical power system for student hybrid rocket filling and launch
- teaching experience in introduction to computer science for scientific computation (Matlab) & introduction to electronics

### Software Skills:

advanced project experience in Python, Julia, C, C++, Matlab ■ advanced project experience with PyTorch, TensorFlow, ROS  
extensive experience with embedded systems, Linux, HPC, Slurm, AWS ■ working knowledge of CUDA, Fortran, Java, JS

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## MISC

Aero & Astro Student Advisory Committee ■ LA Marathon ■ General Ham Radio License ■ PADI Assistant Instructor