MAX B. RUDOLPH

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EDUCATION

Georgia Institute of Technology   *December 2021*
M.S. in Electrical and Computer Engineering
Concentrating in Machine Learning and Robotics   GPA: 4.0/4.0

Georgia Institute of Technology   *May 2020*
B.S. in Electrical Engineering (Highest Honors)
Minor in Robotics   GPA: 3.86/4.0

PUBLICATIONS

3. A Bi-Level Approach to Learning Coalition Formation and Control from Expert Demonstrations
   Rudolph, M., Goecks, V., Bohannon, A., Waytowich, N., Ravichandar, H.
   under submission

2. Desperate Times Call for Desperate Measures:Towards Risk-Adaptive Task Allocation
   Rudolph, M., Chernova, S., Ravichandar, H.
   IEEE International Conference on Intelligent Robots and Systems (IROS) 2021

1. Heterogeneous Multi-agent Coverage Control for Range Limited Robots
   Rudolph, M., Wilson, S., Egerstedt, M.
   IEEE International Conference on Robotics and Automation (ICRA) 2021

RESEARCH EXPERIENCE

Robot Autonomy and Interactive Learning Lab   2020 - Present
Georgia Tech *Advisors: Profs. Harish Ravichandar* and *Sonia Chernova*

- Research structured multi-agent learning algorithms to learn low-level controllers for heterogeneous multi-agent teams
- Learning dynamics aware navigation policies for quadruped robots and sim2real
- Develop methods to learn high-level multi-agent coordination policies

Robotics and Intelligent Systems Lab   2018 - 2020
Georgia Tech *Advisor: Prof. Magnus Egerstedt*

- Created novel extension of Lloyd's algorithm for coverage control to leverage heterogeneous systems of robots
- Designed algorithms for optimal control of swarming robots with limited sensing ranges

Georgia Tech Systems Research Lab   2017 - 2018
Georgia Tech *Advisor: Prof. Fumin Zhang*

- Developed techniques to optimally control swarms of 4 nano-blimps in leader-follower array
- Designed algorithms and implemented software for aerial swarms to locate maxima and minima in unknown fields

- Robot Autonomy and Interactive Learning Lab, 2020 - Present, Georgia Tech - Research structured multi-agent learning algorithms to learn low-level controllers for heterogeneous multi-agent teams -

Learning dynamics aware navigation policies for quadruped robots and sim2real - Develop methods to learn high-level multi-agent coordination policies

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Mechatronics, Robotics, and Controls Laboratory $\hfill$ Summer 2017
New York University *Advisor: Prof. Vikrim Kapila*

- Designed, prototyped and built robotic finger actuator to aid in stroke rehabilitation
- Taught basic robotics and mechatronics to 60 New York high schoolers as part of a study on the effect of robotics education on students' problem-solving skills

POSTER PRESENTATIONS

- **Heterogeneous Multi-agent Coverage Control**
  Rudolph, M., Wilson, S., Egerstedt, M.
  Poster presented at the 2020 Undergraduate Research Program, Georgia Tech

- **FLYIR: An Integrated solution for SLAM in Disaster Scenarios**
  Rudolph, M., Shah, B., Zhang, F.
  Poster presented at 2018 Idea2Prototype Convention

- **NanoBlimp: A Platform for Multi-Agent Systems Research**
  Rudolph, M., Mishra, V., Zhang, F.
  Poster presented at 2018 Vertically Integrated Projects Poster Session

WORK EXPERIENCE

Autonomous Systems Intern $\hfill$ May 2020 – August 2020
Jet Propulsion Laboratory

- Validated guidance and control algorithms for the Psyche spacecraft
- Developed analysis algorithms for Monte Carlo simulations of spacecraft pointing algorithms
- Built dynamic system to update spacecraft simulation with ever-changing spacecraft properties

Flight Software Lead $\hfill$ January 2019 – January 2020
Georgia Tech Yellow Jacket Space Program (YJSP)

- Developed software for state estimation and control of TIAT, YJSP's testbed rocket
- Wrote C++ code to read gyro and accelerometer values for a second order state-estimator
- Designed PID controller to control the attitude canards on the rocket

Mars 2020 Software System Testbed Intern $\hfill$ May 2019 – August 2019
Jet Propulsion Laboratory

- Developed test procedures for the Mars 2020 System Testbed
- Wrote automation scripts in Python for the Remote Sensing Mast (RSM) on the Mars 2020 Rover

- Automated image acquisition tests by developing procedures to interface with Ground Data System

- Ran flight software tests on the engineering model of Mars 2020 rover to detect software failures

- Performed range of motion tests for azimuth and elevation actuators for RSM

Intern in Science and Tech May 2018 – August 2018

National Security Agency

- Repaired and operated small Unmanned Aerial Systems (UAS) for antenna elevation

- Analyzed flight data from Pixhawk flight controller using MATLAB to validate Real Time Kinematic (RTK) algorithms

- Built and tested RF-Fiber Optic communication systems

- Performed load analysis on analog RF and fiber optic components

AWARDS AND HONORS

Georgia Tech Stand-up Comedy Contest Winner, *Georgia Tech Comedy Show*	2018
Idea2Prototype Award, *Georgia Tech, Create-X*	2018
Student Faculty Program *Jet Propulsion Labrotory, Caltech*	2019,2020
Faculty Honors *Georgia Tech*	2016-2020
Dean's List *Georgia Tech*	2016-2020

LEADERSHIP

IEEE Robotics Club, Controls Team Lead	2017-2020
The Makery @ Georgia Tech, President	2018-2019
Yellow Jacket Fencing Club, Captain	2018, 2021
Yellow Jacket Space Program, Software Lead	2019

TEACHING EXPERIENCE

- **ECE 3084: Signals and Systems** Georgia Tech	2020-2021
- **PHYS 2211: Intro to Physics** Georgia Tech	2017-2020

SKILLS

Languages: Python, Matlab, C++ , Java
Software: PyTorch, NumPy, ROS, Tensorflow, git, LaTeX, Microsoft Office, Robotarium, AutoDesk Inventor, OnShape

RELEVANT COURSEWORK

Statistical ML	Mathematical Foundations of ML	Applications of DSP
Linear Systems and Control	Networked Control	Deep Learning
Digital Image Processing	Machine Learning	Modern System Theory
Signals and Systems	Dynamics of Rigid Bodies	Advanced DSP