

Christopher Richardson

1163 West Peachtree St NE, Apt 1515
Atlanta, GA 30309
404-819-8257
crichardson332@gmail.com

INTERESTS Autonomy for robotic systems; assured/robust autonomy; multi-vehicle control and coordination; flight controls; stochastic/Bayesian estimation; path-planning; trajectory optimization; machine learning; deep learning; neural nets

EXPERIENCE *Research Engineer I* July 2017-Present

Georgia Tech Research Institute, Atlanta, GA

- Collaborative Autonomy Group
- Multi-vehicle and swarm autonomy algorithm development
 - Formation and coordination using geometrically defined formations in a leader-follower model
 - Path planning using stochastic algorithms (RRT) and geometric optimization (Dubins)
 - Simple PID controls for following defined paths (racetracks, staging orbits, etc.)
- Integration and flight testing of UAV swarms
 - Cross-compiled autonomy onto ODROID hardware for HiL and flight testing
 - Vehicles operated through GTRI's Swarm Operator Interface (SOI)
 - Flight testing of four autonomous helicopters controlled by Georgia Tech GUST autopilot (Eric Johnson)

Guidance, Navigation, and Control Engineer
Aurora Flight Sciences, Cambridge, MA

June 2016-June 2017

- Development of multi-vehicle task allocation and path planning tool for small business technology transfer (STTR) program
 - Partnered with MIT to demonstrate algorithms in a scenario involving a satellite constellation
 - Developed simulation in Python and ported algorithms from C++
 - Task allocation using consensus-based bundle algorithm (CBBA)
- Development and implementation of autopilot for Darpa's ALIAS program
 - Design of minimally-invasive robotic system with perception and actuation that adds autonomy to existing aircraft
 - Designed state estimation system fusing data from inertial navigation with air data and magnetometer measurements from perception system
 - Involved in full design process, including simulation and analysis, hardware-in-the-loop simulation, and flight test
- Control system design and analysis, including both time-domain and frequency-domain methods
- Gain scheduling and optimization using control design tools in Matlab and Simulink

Graduate Research Assistant January-May 2016
Georgia Institute of Technology, Atlanta, GA

- Performed online parameter identification for helicopter vibration control
- Researched various algorithms including Recursive Least Squares and Kalman filter
- Tested algorithms in Matlab simulation environment and verified results with nonlinear simulation in FlightGear

Robotics Modeling and Simulation Co-op January-July 2015
Jet Propulsion Laboratory, Pasadena, CA

- Developed multibody dynamics simulation of a Mars helicopter
- Created C++ models for aerodynamics and helicopter mechanisms
- Developed fully configurable, easy-to-use Python simulation for ease in testing various helicopter designs and rotor mechanisms
 - Simulation used by Mars helicopter design team to assist in gaining a fundamental understanding of helicopter dynamics in a Martian environment

Graduate Student Intern Summer 2014
Jet Propulsion Laboratory, Pasadena, CA

- Assisted in the design of a low cost heliostat for concentrated solar power plants
- Contributed to trade studies and demonstrated lower cost for alternatives with standalone power analysis
- Developed model for sun tracking algorithm and control system for heliostat

Undergraduate Design Engineer Spring/Summer 2013
Georgia Institute of Technology, Atlanta, GA

- Founding member of the RECONSO team, winner of the 8th iteration of the University Nanosat Program
- Performed requirements analysis and trade studies for various subsystems

EDUCATION *Master of Science, Aerospace Engineering* May 2016
Georgia Institute of Technology
GPA: 3.91/4.00

Bachelor of Science, Highest Honors, Aerospace Engineering May 2013
Georgia Institute of Technology
GPA: 3.91/4.00

SOFTWARE SKILLS *Expert:*
C++, python, git, subversion, ROS, Matlab, Simulink, object-oriented software design, unit testing

Intermediate:
C, bash/shell Scripting, cmake, make/makefiles, gtest, boost libraries, swig, doxygen, gdb, MavLink