# Samuel Buckner

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## EDUCATION

### UNIVERSITY OF FLORIDA
B.S. in Aerospace Engineering
Aug 2017 - Present | Gainesville, FL
Cum. GPA: 3.77 / 4.0

### FLORIDA GULF COAST UNIVERSITY
A.A. in Civil Engineering
Aug 2015 - Jun 2017 | Fort Myers, FL

## SKILLS

### GENERAL
GN&C • Robotics • Dynamic Modeling
Simulation Design • Machine Learning
Machining • 3D Printing • Prototyping
Soldering • Circuitry • HAM Radio
Certified Home Inspector

### PROGRAMMING
Python • MATLAB • C/C++ • LaTeX
Robot Operating System (ROS)
Unix/Linux • Windows • MacOS
Git • SVN • VirtualBox • WSL
Eigen • PyTorch • Numpy • PyQt
HTML • XML • YAML

### SOFTWARE
Simulink • LabVIEW
SolidWorks (CSWA Cert) • OnShape
Systems Tool Kit (L1 Cert)
Arduino • LTspice • WaveForms
Ardupilot • QGroundControl

## EXPERIENCE

### NASA JOHNSON SPACE CENTER | Pathways Co-Op Trainee
May 2020 - Present | Houston, TX
- EG6: Autonomous GN&C - ROSIE Rendezvous Emulation Robotics
- Upgraded ROSIE's C++ codebase with improved 6-DOF PID control, trajectory sequencing, sensor integration, noise filtering and PyQt5 GUI analytic toolkit
- Developed LiDAR collision detection and retroreflector cluster identification algorithms with PCL (Point Cloud Library) for docking relative navigation
- Led ROSIE performance testing campaign with OptiTrack motion capture feedback and Velodyne LiDAR payload through extensive test matrix validation
- Side project: Validated and refactored a cockpit graphical display C-library with MATLAB MEX functions, geometric modeling and GUI test interface

Jan 2020 - May 2020 | Houston, TX
- CM45: COMPASS Team - Human Landing System (HLS) Simulation Design
- Developed Python/C++ lunar ascent simulation from scratch incorporating linear tangent guidance, sensor/actuator models and a finite-state machine
- Analyzed, tested and SVN-deployed simulator with integrated vehicle/terrain graphics & visualization in collaboration with the JPL DARTS Lab
- Developed instantaneous-impact trajectory propagation tool for risk analysis

Aug 2018 - Dec 2018 | Houston, TX
- EG4: Integrated GN&C Analysis - Commercial Crew Program (CCP)
- Conducted trade studies on new C++ algorithms and assessed launch abort trajectories with MATLAB unit-tests and custom Python analysis toolkits
- Assessed and tuned weights for linear-optimized thrust control allocation
- Analyzed Monte-Carlo failure anomaly possibilities for parachute deployment

### NASA LANGLEY RESEARCH CENTER | Fit2Fly Researcher
May 2019 - Aug 2019 | Hampton, VA
- Developed a Python multi-UAS software-in-the-loop (SITL) feasibility simulator
- Modified simulator for hardware-in-the-loop (HITL) testing for netted demo
- Developed a PyTorch image classifier to track UAS radio signals to 98% acc.

## RESEARCH

### ADAMUS LABORATORY | Undergraduate Research Assistant
Jan 2019 – Present | Gainesville, FL
- Flight Software Lead: Led development of on the first ROS-based (Python/C++) CubeSat flight software selected for two demonstration missions (Drag-Deorbit Device and PATCOOL) both targeting an October 2021 launch date
- Developed modules for radio telemetry links, GPS navigation, command processing, software updates and failsafe reboots
- Created C++ state simulator and assessed guidance tracking performance (including LQR/EKF) against MATLAB version

Apr 2018 – Dec 2018 | Gainesville, FL
- Research Assistant: Developed Simulink validation model of two-satellite relative dynamics under J2 perturbations
- Implemented an extended burn control algorithm for orbital trajectory reconfiguration validated with emulation robotics

## PROJECTS

Vertical Takeoff & Landing (VTOL) Hopper | May 2018 – Present | Gainesville, FL
- Designed a 2-DOF thrust vector control (TVC) system with IMU navigation and throttleable ducted-fan propulsion
- Modeled TVC four-bar linkage kinematics, developed Arduino flight software and tested TVC actuator with precise results

CanSat Competition Structures Team Lead | Aug 2017 – May 2018 | Gainesville, FL
- Led development and drone drop-tested a competition-ready CanSat build under a $650 budget
- Contributed prototype designs, mechanical improvements/optimizations and MATLAB numerical solver toolkits