DUNCAN MCGOUGH

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EXPERIENCE

Space Exploration Technologies Corporation (SpaceX) May 2019 - August 2019
Associate Engineer - Post Grad, Thermal-Fluid Analysis *Hawthorne, CA*

- Responsible for thermal analysis of Starlink Hall Thruster. Developed thermal model to help determine duty cycle and update various thruster components to have increased performance. Simplified thermal interfaces between thruster and satellite chassis.
- Performed thermal analysis on Falcon 9 fairing to determine feasibility of simplification of the thermal protection system.
- Analyzed Dragon spacecraft Draco hypergolic engine. Determined bounds on thrust forces caused by potential fault cases to help analyze tanks for propellant unsettling.
- Created thermal models of star trackers, propellant tanks, and propulsion avionics for Deluxe Bus satellite. Created scripts to determine thermal cycling for use by reliability team during avionics qualification.
- Analyzed Falcon 9 second stage fuel baffle to determine maximum possible tolerances between fasteners. Determined worst case tolerance resulted in unacceptable fuel leakage.

Space Exploration Technologies Corporation (SpaceX) May 2018 - August 2018
Satellite Development Intern, Thermal-Fluid Analysis *Seattle, WA*

- Produced and data-correlated a multiphysics ANSYS model of the hall-effect thruster used in the "Tintin" and potential Starlink constellation. Model determined thermal expansion, temperatures, stress/strain, and vibration modes to inform the propulsion team on design choices for materials, sizing, and power as well as operation modes in orbit. Tested thruster coils in thermal vacuum chambers.
- Developed a Python script that utilizes a machine learning clustering algorithm to simplify phased-array antennas for input into Thermal Desktop. Reduced necessary modeling and computational time in Thermal Desktop as a result.
- Designed and constructed a test bed for determining performance of thermally-cycled heat pipes. Determined the initial performance of various heat pipe geometries and provided feedback for antenna thermal design.
- Produced a multiphysics thermal-structural ANSYS model of phased array antennas and their beamformer chips to provide design feedback for structural and antenna team on power, structure, and placement of components.

Roccor LLC May 2017 - August 2017
Thermal Engineering Intern, Thermal Group *Longmont, CO*

- Engineered thermal vacuum chamber for deployable composite CubeSat radiators. Met NASA and Roccor project requirements and worked with machinists and welders to manufacture the chamber. Operated within project budgets and deadlines. Designed and simulated in SolidWorks and validated results by hand. Worked with FLIR instrumentation for chamber with IR optics. Developed Thermal Desktop model for system. Calibrated and tested chamber. Assisted thermal team with next-generation heat pipe development. Tested thermal solutions with high-vacuum systems.

COBRA "Spaceshot" Suborbital Rocket Development Team March 2016 - January 2018
Propulsion Lead *Boulder, CO*

- Manage propulsion subteam. Modeled oxidizer injector assembly and used CFD and FEA to validate designs. Calculated nozzle geometry and flow rates. Designed liquid oxidizer storage and delivery/injection systems for a hybrid rocket.

Gridded Electrostatic Ion Thruster Research BalloonSat Project January 2016 - May 2016
Team Lead *Boulder, CO*

- Led a team of CU Boulder students in an engineering projects class to design, test, and fly a high-altitude BalloonSat payload. Developed, researched, and constructed a low-cost gridded electrostatic ion thruster to test at altitude for deployment upon CubeSats. Designed and soldered power distribution for environmental sensor data collection and thruster. Analyzed data retrieved.

EDUCATION

University of Colorado, Boulder *August 2015 - Present*
Engineering Honors Program, Chancellor's Scholarship
Masters of Science, Aerospace Engineering Sciences with focus on Fluids and Propulsion *Expected Graduation: May 2020*
Bachelor of Science, Aerospace Engineering Sciences May 2019
Bachelor of Music, Violin Performance (College of Music Scholarship Award) August 2015 - May 2016

STRENGTHS AND SKILLS

Programming	Python, MATLAB, Julia, C++, LABVIEW, LaTeX
Software	ANSYS, Thermal Desktop, CFD (OpenFOAM), CAD (SolidWorks, NX), Microsoft Office Suite
Equipment	Microcontrollers, 3D printers, high-vacuum systems, shop equipment, electrical equipment (e.g. soldering)
OS	Linux, OSX, Windows, using Virtual Machines
Personal Interests	Violin, tuner car modification, freeride skiing, mountain biking, martial arts