

Eric Anthony Comstock

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PhD student and Research Assistant in the Low-Gravity Science and Technology Lab Georgia Institute of Technology

SUMMARY OF QUALIFICATIONS:

- Broad and deep experience in aerospace research in multiple domains (high enthalpy/high fidelity hypersonic computational fluid dynamics modeling, light-particle interactions, simulations and numerical algorithm development, and optical diagnostics)
- Research in the spring of 2023 will involve spaceflight applications projects within the fields of microgravity and low-gravity research
- Substantial programming experience creating numerical simulations using Python, and experience using C++ and MATLAB
- Minor fields of study in both chemistry and mathematics, including classes in chemical quantitative analysis, chemical equilibria, nuclear chemistry, physical chemistry, and a graduate course in aerothermochemistry. Math courses include complex analysis, linear algebra, and a graduate course in numerical methods for partial differential equations
- **3.87/4.0 Cumulative GPA**, Bachelor of Science in Aerospace Engineering with Engineering Honors, Texas A&M University – College Station, December, 2022

TECHNICAL SKILLS:

Languages: Python, C++
Software: Solidworks 3D Modeling, Maple, MATLAB, General Mission Analysis Tool (GMAT), NEQAIR, Pointwise, US3D
Applied Math: Finite Difference Method and Finite Element Analysis for hyperbolic and parabolic PDEs in arbitrary dimensional spaces, Rigid Body Dynamics, Runge-Kutta 4, Least Squares Method, Control Systems Analysis (Laplace transfer functions and state-space systems)

RESEARCH / PROFESSIONAL EXPERIENCE:

Graduate Research Assistant – Low Gravity Science and Technology Lab

as of January, 2023

Georgia Institute of Technology

- Research Assistant for Dr. Alvaro Romero-Calvo, Director of the Low-Gravity Science and Technology Lab. I will be working on various activities in the fields of microgravity and low-gravity research. Initially, I will be working on electromagnetically enhanced low-gravity electrolysis with applications that include life support for human spaceflight and spacecraft propulsion.

Undergraduate Research Assistant – Aerothermochemistry and Hypersonics Lab

September, 2022 – December, 2022

Texas A&M University – College Station

- Research Assistant for Dr. Rodney Bowersox, Director of the National Aerothermochemistry and Hypersonics Lab at Texas A&M University. Research includes use of NEQAIR software to generate spectra of chemically reacting hypersonic flows in a Mach stem, and use of Pointwise and US3D for CFD simulation of said chemically reacting hypersonic flows.

Undergraduate Summer Research Assistant – Laser Diagnostics and Plasma Devices Lab

June, 2022 – August, 2022

Texas A&M University – College Station

- Research Assistant for Dr. Chris Limbach, Director of the Laser Diagnostics and Plasma Devices Lab at Texas A&M University – College Station. Funded by a highly selective research grant (USRG, mentioned below under Honors, Awards and Leadership). This was a continuation of the previous model created in the spring, adding a model of a section of the apparatus containing collisionless flow and modeling the interactions of a laser with this flow. This will be used to compare to the result obtained in the experiment.

Undergraduate Research Assistant - Laser Diagnostics and Plasma Devices Lab

January, 2022 – May, 2022

Texas A&M University – College Station

- Research Assistant for Dr. Chris Limbach, Director of the Laser Diagnostics and Plasma Devices Lab at Texas A&M University – College Station. Characterization of the refraction and diffraction of monochromatic directed energy through media of changing particle densities, accomplished by superimposing a laser and a rubidium supersonic jet to create a hybrid beam. This was then analyzed through absorption spectroscopy to determine the magnitudes and types of interactions involved.
- Research involved creation of a Python computational model of a supersonic flow of argon and rubidium through the initial parts of an apparatus designed to test potential laser/particle beam coupling behavior.

Teaching Assistant for Numerical Simulation

January, 2021 – May, 2021

Texas A&M University – College Station

- Graded papers for senior level class in Finite Difference and Finite Element Analysis (AERO 430)

Undergraduate Research Assistant – Optical Diagnostics

January, 2021 – May, 2021

Texas A&M University – College Station

- Research Assistant for Dr. Adonios Karpetsis, Associate Professor, Aerospace Engineering Department. Research involved creating a Raman spectroscopy simulation program in Python simulating rotational vibrational spectra for use in hypersonic flow spectroscopy.

Undergraduate Research Assistant - Organic Chemistry

January, 2020 – May, 2020

Texas A&M University – College Station

- Research Assistant for Dr. Quentin Michaudel, Director of the Michaudel Lab at Texas A&M University – College Station. Organic chemistry research that resulted in a departmental paper entitled “Bottom-Up synthesis of n-doped Polycyclic Aromatic Hydrocarbons.”

SYSTEMS ENGINEERING EXPERIENCE:

Individual School Project: Reverse-engineering of the design process of the New Horizons space probe

- Stakeholder identification and CONOPS generation
- Mission-level systemic and technical requirements identification
- Mapping mission-level requirements to subsystems
- Systems validation against requirements

Team School Project: Senior capstone design project – design of a cis-lunar navigational satellite constellation designed to provide high quality navigational data to objects in cis-lunar space, and allow for communication between these objects and Earth

- Lifetime budgetary validation for launch, operations, and component costs
- Verification that the deorbiting procedure complies with regulations
- Validation of navigational system accuracy
- Validation of component and system lifetime
- Pareto analysis and tradespace optimization, written in Python, of the designs generated
- Analysis of the limitations of the simulator being used for performance validation and design generation and simulation

Team School Project: Space system design project – design of a next generation lunar lander to supplement or replace Starship for missions after Artemis III, Propulsion sub-team

- Responsible for trade studies and choice of propellant and nozzle shape for main and reaction control propulsion systems

- Responsible for trade studies and choice of number and placement of both main and reaction control engines
- Significant contributions to system requirements document and trade study plan for propulsion sub-team
- Maintained high breadth and depth of knowledge for propulsion sub-system, serving as the subject matter expert
- Responsible for CAD modeling of main and reaction control engines
- Significant contributions to system reference documents at PDR and CDR

HONORS, AWARDS AND LEADERSHIP:

- Awarded the Summer, 2022 Undergraduate Summer Research Grant (USRG) at Texas A&M - College Station. This is a highly selective grant for the summer of 2022 funded by the College of Engineering, open to STEM students from all over the country who plan to attend graduate school.
- Dean's Honor Award, Fall, 2022, Spring, 2022, Fall, 2021, Fall 2020
- Engineering Honors Program
- Tau Beta Pi, Engineering Honor Society, November, 2020
- National Chemistry Olympiad, Honors designation in 2018 and in 2019 (top 150 students nationwide)
- President, Chemistry Club, Lone Star College – Montgomery, 2017

EDUCATION: Texas A&M University – College Station, Bachelor of Science in Aerospace Engineering, December, 2022, Minors: chemistry and mathematics, GPA: 3.87/4.0
Georgia Institute of Technology, PhD student (as of January, 2023)