



NASA JSC-UNT SWE Presentation

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AST, Heat Transfer

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Outline

National Aeronautics and
Space Administration



- My Background
- NASA Programs
- My group at NASA: ES3 Thermal Design Branch
- Internship Information
- Professional Development and Resume Tips
- Questions



My Background

My Professional Background

2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021



B.S. AAE '13

GE Combustion Intern Spring '12
GE PLM Intern Summer '13



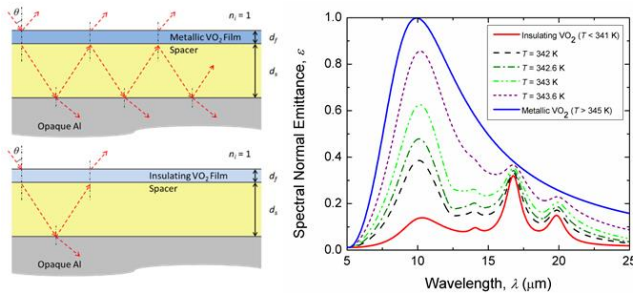
Ph.D. Aerospace Engineering '20

NASA Space Tech Research Fellow '16-'20
Pathways Intern Spring and Summer '20
Full-Time at NASA January '21

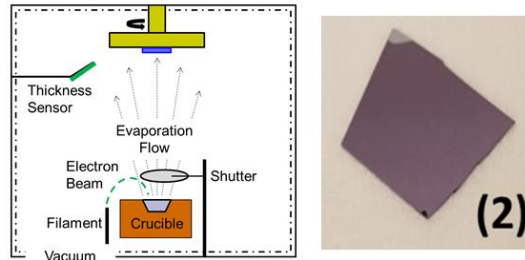


My Research Background

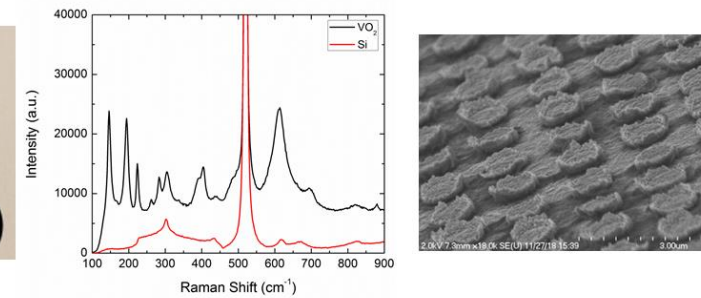
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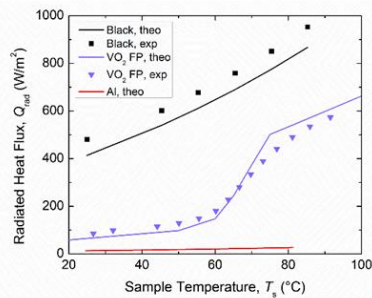
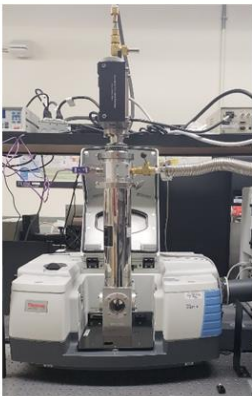
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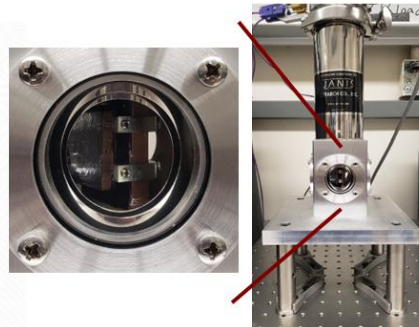
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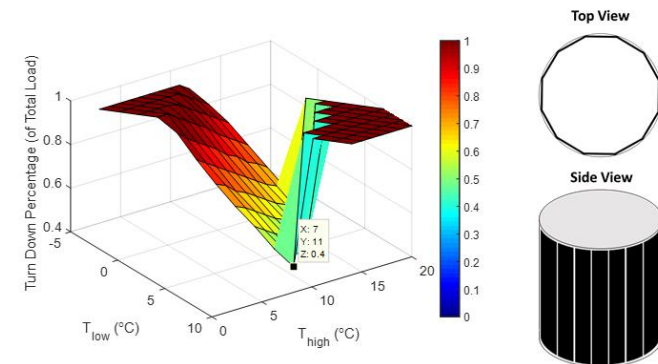
Optical Characterization:



Thermal Testing:



Systems Modeling:



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NASA Programs



THE INTERNATIONAL SPACE STATION

Continuously occupied since November 2000, the International Space Station has hosted 240 individuals from 19 countries. Travelling at approximately 17,500 mph, the station orbits Earth 16 times every 24 hours.



COMMERCIAL CREW **PROGRAM**

NASA's Commercial Crew Program is a partnership with multiple commercial partners to include Boeing, SpaceX, Sierra Nevada, and more to develop and fly human space transportation systems



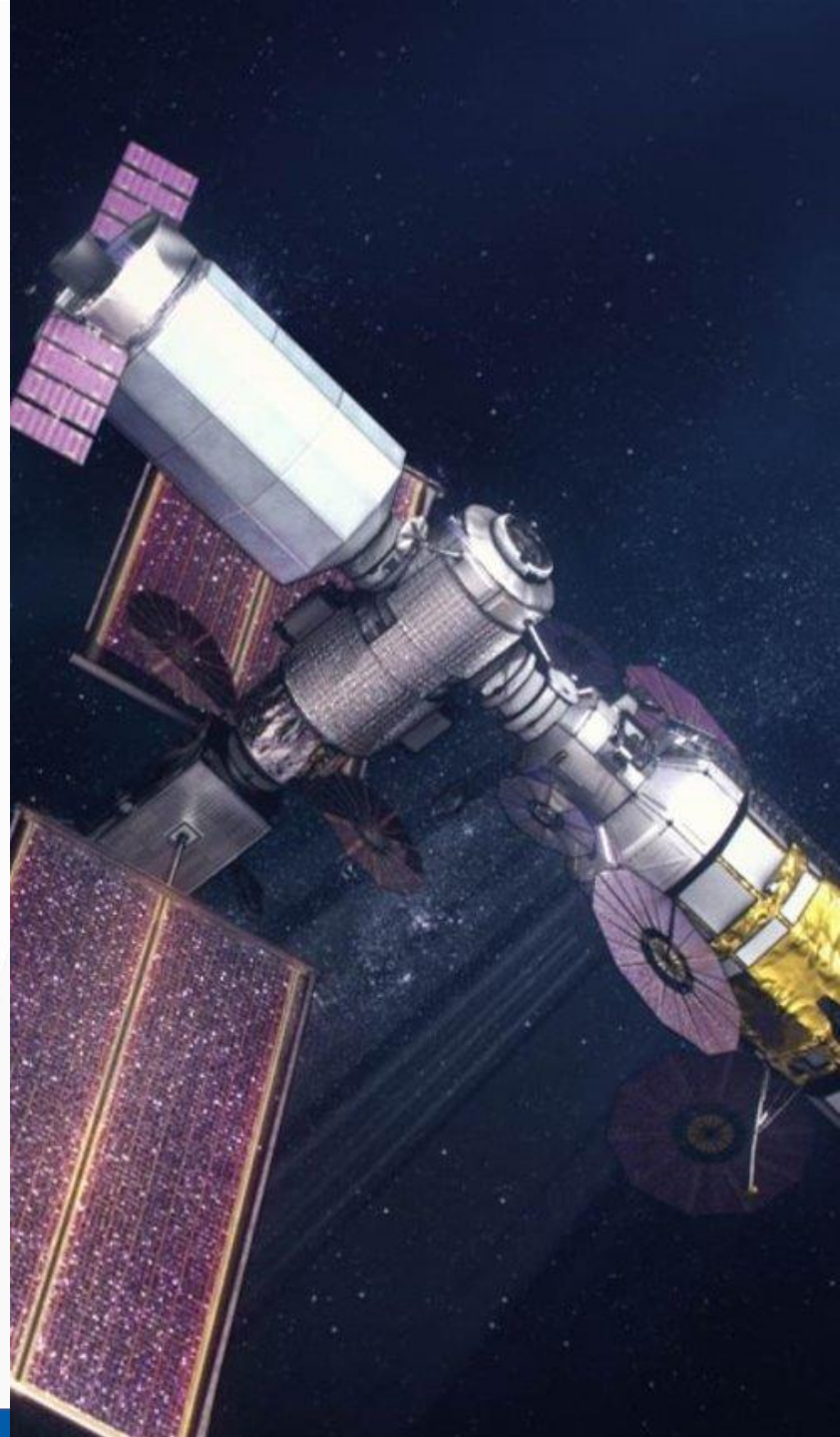


ORION **SPACECRAFT**

Orion is a new NASA spacecraft for astronauts. The spacecraft is an important part of NASA's Artemis program that includes sending the first woman and the next man to the Moon by 2024. Orion will carry astronauts into deep space, and then return them home safely to Earth.

GATEWAY

The Gateway will be an outpost orbiting the Moon that provides vital support for a sustainable, long-term human return to the lunar surface, as well as a staging point for deep space exploration. It is a critical component of NASA's Artemis Program.



National Aeronautics and
Space Administration



My Group at NASA

Engineering Structures (ES) Division

Human Rated Structures Themes

Human Rated S/C Structures

- Durable, Lightweight Materials
- Inflatable Habitat Structures
- Composite Cabin Structures

Spacecraft Mechanical Systems

- Ultra-Lightweight Docking Systems
- Lightweight Hatch Systems
- Low Shock, Compact Separation Systems
- Extreme Environment Mechanisms
- Reliable/Fault Tolerant Mechanisms
- Deployment of Very Large Structures
- Autonomous Joining of S/C Elements

Entry, Descent and Landing

- High Energy TPS Systems
- Large, Deployable Mechanical Aeroshells
- Targeted Spacecraft Descent System
- Zero Velocity Spacecraft Landing System

In-Space Structural Monitoring, Evaluation and Repair

- Detect Impacts & Determine Magnitude
- Rapid Leak Detection and Localization
- Non-Destructive Evaluation Techniques
- In-space Repair Methods
- In-space Manufacturing of Spare Parts

Structures – ES2

- Metallic, Composite, Inflatable Spacecraft Structures
- Spacecraft Windows

Thermal Design – ES3

- Entry Thermal Protection Systems
- Passive Thermal Control Systems

Materials and Processes – ES4

- Nondestructive Evaluation
- Metallic & Non-Metallic Materials
- Materials Compatibility & Evaluation

Mechanical Design and Analysis – ES5

- Docking, Berthing, & Grappling Systems
- Door/Hatch/Array Drive and Latching Systems
- Deceleration and Landing Systems
- Attachment and Separation Systems

Loads and Structural Dynamics – ES6

- S/C Structural Dynamic Modeling, Analysis, and Test
- S/C Contact Dynamics & Advanced Nonlinear Analysis

Structures Division Core Competencies

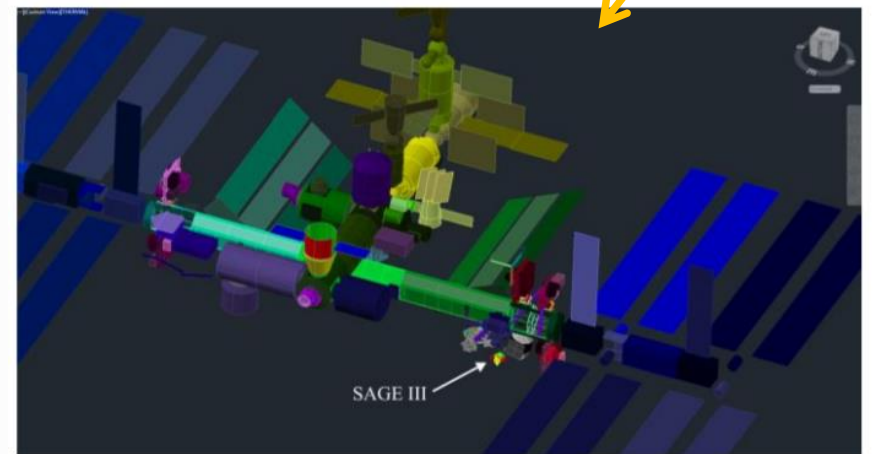
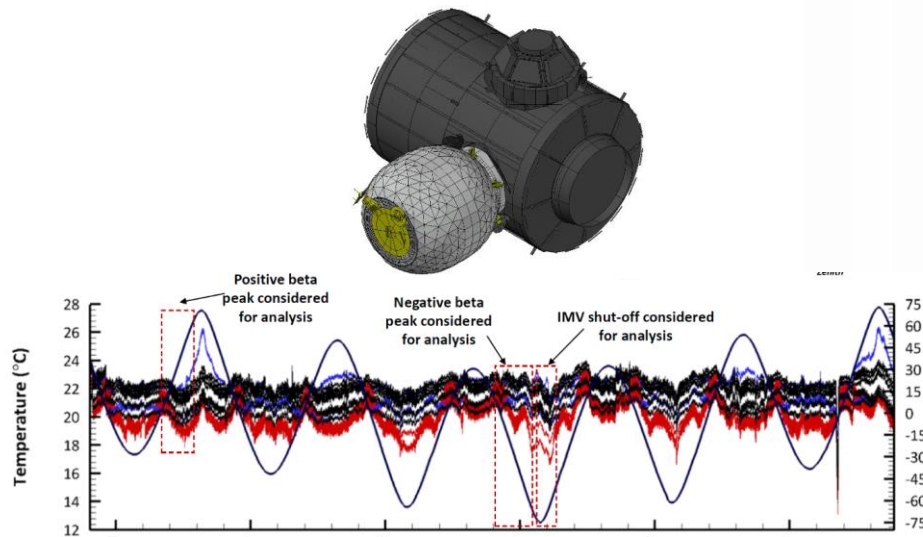
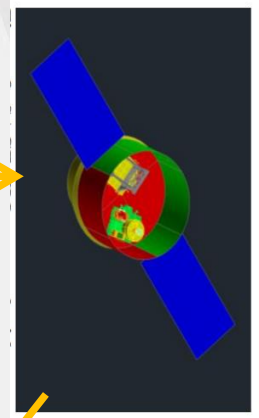
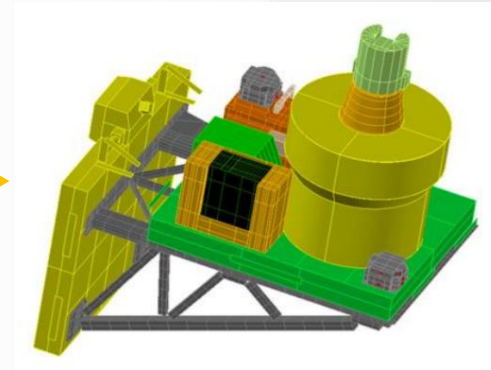
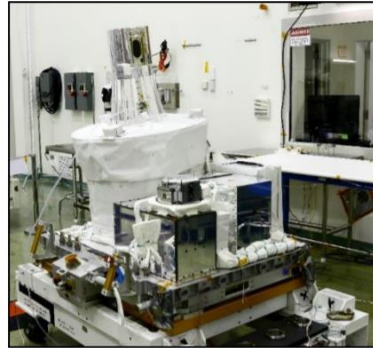
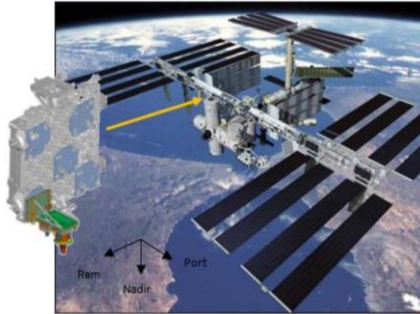


Thermal Design Branch

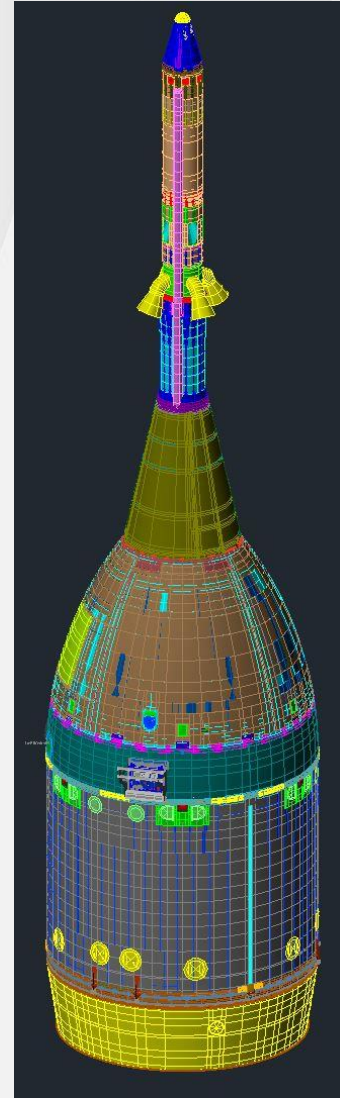
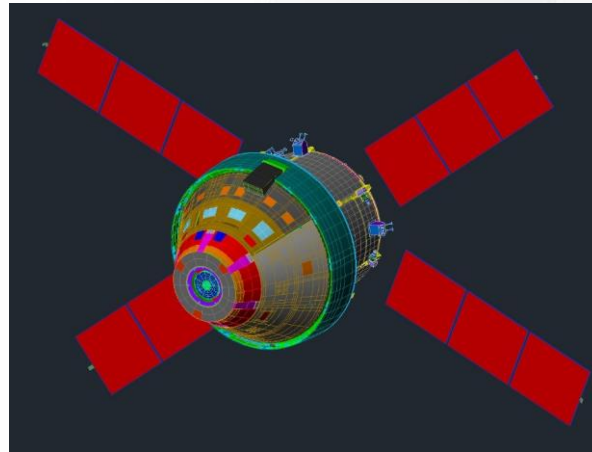
Support spaceflight programs with passive thermal control and thermal protection system design, analysis and system management while seeking wedges for system development, technology development, and innovation.

- Support ISS, Orion, CCP and Gateway
- Ensure success of Commercial partners
- Engage in multiple projects focusing on:
 - Hands-on work
 - Thermal vacuum testing
 - Li-ion battery calorimeter
 - Design and analysis work
 - VIPER
 - BEAM thermal assessments
 - Thermal response model development
- Technology development
 - Advanced TPS sensors
 - 3-D printed ablators
 - Advanced thermal control hardware
 - Advanced high temperature test capability
- Skill development in:
 - Design
 - Analysis
 - Test
 - System Management

International Space Station Passive Thermal Control



Orion Passive Thermal Control

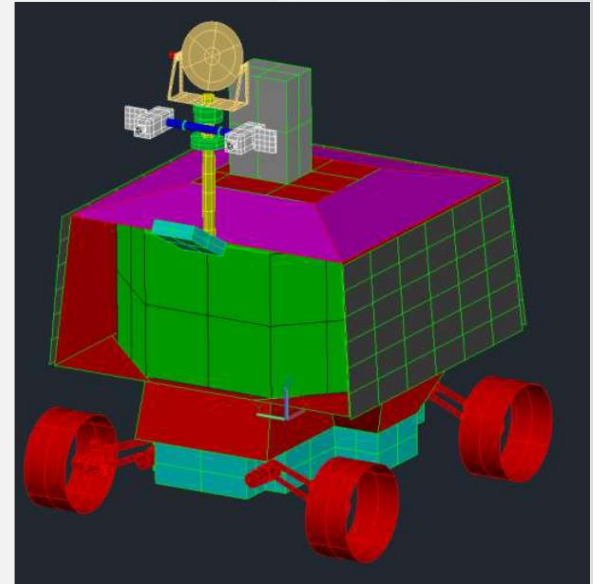


Passive Thermal Control Technology Development

Novel Passive Thermal Control System

93" X 96" X 81"

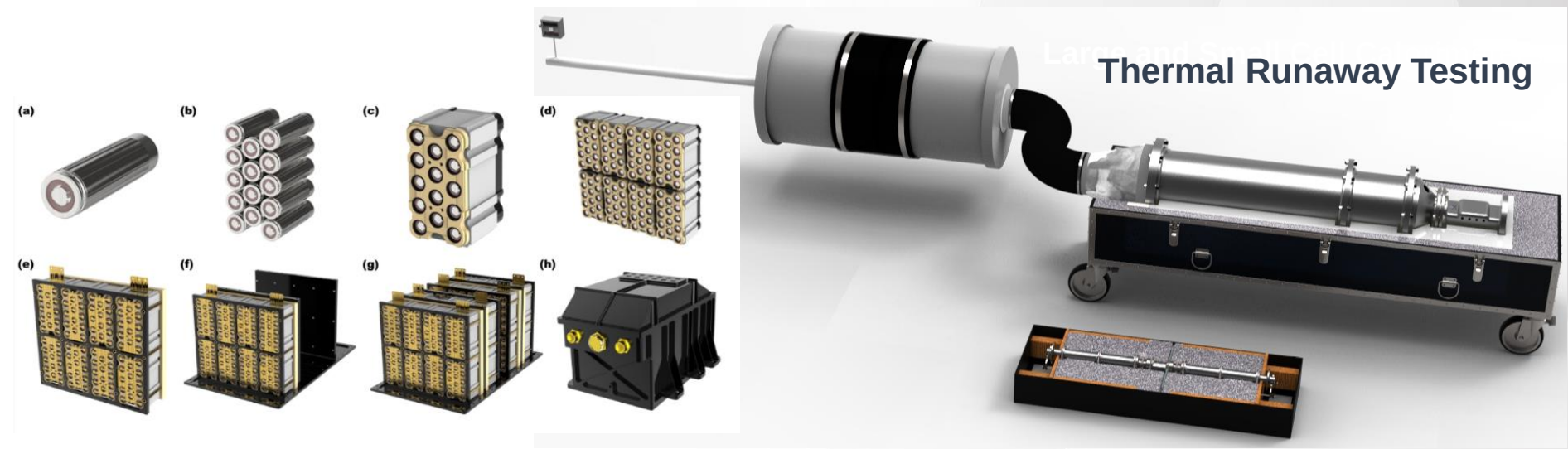
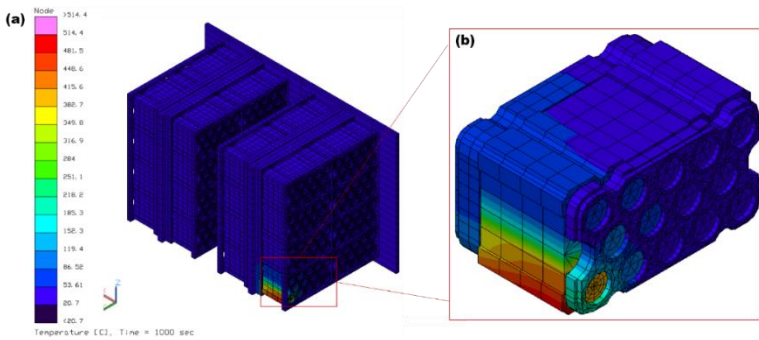
VIPER Rover Passive Thermal Control Design and Analysis



Passive Thermal Flight Experiment



Battery Thermal Analysis and Testing



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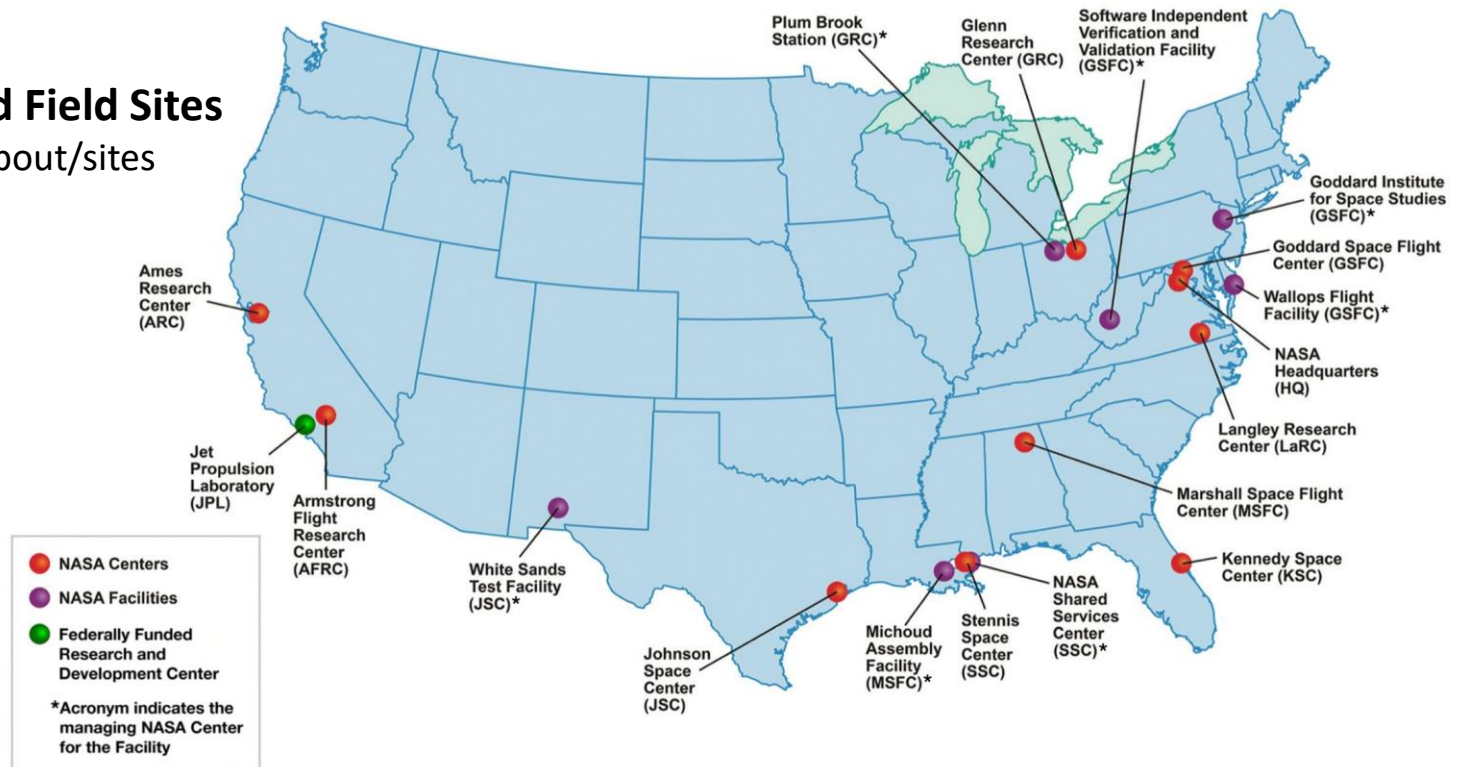


NASA Internships

NASA Locations

NASA Centers and Field Sites

www.nasa.gov/about/sites



Johnson Space Center (JSC) Houston, TX

- Home of NASA's Astronaut Corps and Mission Control-the nerve center for America's human spaceflight program
- Leads efforts in human space exploration, pushing the boundaries of space flight, biological science, and research into how humans can live and thrive in space
- Serves as the lead for the International Space Station, Orion, Commercial Crew and Cargo, and Gateway
- Supports future missions, including partnering with industry to expand commercial access to space and efforts to send humans back to the moon and on to Mars



**Just a sample,
not limited to
listed majors*



Some skills that NASA routinely needs:

- Programming: C++, JAVA, HTML
- CAD, PRO-E, Matlab, 3D Modeling
- Networking
- Machine Shop, fabricating, design, prototyping
- 3D printing
- Social Media
- Technical Writing
- Database Administration

**Please note, Engineering Technology degrees do not qualify for Pathways engineering positions. Each position will list preferred or required majors, please see vacancy for specific education requirements.*

Program Requirements



presents a path to NASA employment

At least a 2.9 GPA on a 4.0 scale

Be enrolled in or accepted to an accredited college or university on at least a half time basis

At least 30 semester hours of undergraduate education successfully completed

Be able to complete at least 640 hours of work

At least one year out from graduation

U.S.
Citizenship

At least 16
years of age

At least a 3.0 GPA on a 4.0 scale

Be enrolled full-time in a degree-granting program at an accredited college or university

Diversity and Inclusion at NASA

Our commitment: We promote the principles of diversity and inclusion in an effort to identify the best talent, achieve scientific and engineering excellence, and ultimately realize mission success.

Our Programs: We support a diverse, welcoming, inclusive and equitable NASA community through Special Emphasis Programs and Employee Resources Groups that are focused on nine critical segments of our workforce:

- African American
- American Indian/Alaska Native
- Hispanic/Latino
- Individuals with Disabilities
- Lesbian, Gay, Bisexual, Transgender & Allies
- Veterans
- Women
- Young Professionals





Pathways Internships

What is the Pathways Internship Program?

The Pathways Internship is similar to a co-op opportunity where current students are provided with paid work experiences and dynamic development opportunities for multiple semester.

Pathways offers the chance to jump-start a NASA career, as it presents a path to NASA employment after program completion.

Quick Facts:

- ❑ **Pathways interns are civil servants**
- ❑ Opportunities are available for both STEM and non-STEM majors (we currently have a 70/30 breakdown)
- ❑ Degree levels: College sophomores through Post Graduate
- ❑ Applications Dates: The majority of opportunities are announced in the fall, around September, for appointments that begin in January or June and again around February for appointments that begin in September.



JSC Pathways Program Type of Work

Engineering

- Intern could support several core engineering disciplines including Crew and Thermal Systems, Structural Engineering, Simulation, Avionics, Software, Robotics, Propulsion, Power, and Aeroscience and Flight Mechanics arenas.
- Duties within these areas may be supporting the design, analysis, fracture/fatigue, loads/dynamics, robotics hardware, test materials, electrical power systems, communication/tracking, autonomy, command/data handling, radiation and EEE parts, avionics, and propellants/spacecraft systems
- Examples of possible assignments include:
 - Developing robotics hardware and software that will support missions beyond low-Earth-orbit testing materials, propellants, and spacecraft systems
 - Contributing to groundbreaking development work related to crew health, safety and performance
 - Participation in Human Factors design and development studies

JSC Pathways Program Type of Work

Flight Operations

- Duties may include participating in operator training classes or creating tools to support current and upcoming human spaceflight missions.

Human Resources

- Develop an understanding of Office of Personnel Management standards used for federal human resources work. The work also allows for understanding of NASA specific guidelines for training and development, workforce planning and analytics, performance management, etc

Accounting and Budget

- Duties may include providing business management support to major programs; procuring ground and flight hardware; planning and preparing organizational budgets; conducting financial audits; and planning, awarding, and managing contracts

Business and Industry

- Duties may include a range of administrative tasks within the Procurement (Contracting) or general business field

Pathways Internship Benefits

In addition to pay and valuable work experience, you may receive the same benefits as permanent employees:

- Eligible for conversion to a permanent or term employment after completion of program and degree requirements
- Promotion eligibility while in the Pathways Program
- Health and life insurance
- Federal Employees Retirement System and Thrift Savings Plan
- Paid Federal Holidays
- Annual, Sick, and Military Leave



Timeline for Fall 2021 Pathways Internship Announcement

- ❖ 9/13/21: Announcements Open
- ❖ 9/17/21: Announcements Close
- ❖ 10/29/21: All interview invites sent to candidates
- ❖ 11/12/21: All interviews complete and selections made
- ❖ 1/18/22: First day for JSC selectees
 - ❖ 1/18/22 or 6/6/22: First day at other NASA centers

USAJobs Vacancy Structure

- ❖ Announcements are found at www.USAJobs.gov.
- ❖ Approximately 20 Pathways Internships announcements will be posted
- ❖ Vacancies may list multiple NASA center locations.
- ❖ Each vacancy is structured around a set of specific academic majors.
- ❖ Be sure to apply to the announcement that aligns with both your academic major and preferred NASA center.
- ❖ Centers have different program requirements (full-time vs part-time, start dates, minimum work requirements, etc.) that inform tailored local processes.
- ❖ Can select up to 3 NASA centers



OSTEM Internships

Office of STEM Engagement (OSTEM) Internship

- ❖ Provides students with hands-on project based experiences, both stipend-paid and volunteer, that directly relate to students' academic majors.
- ❖ Interns work on mentor –directed tasks designed to advance projects to the next level.
- ❖ Internship opportunities are available for
 - ☐ High School Students (age 16 or above)
 - ☐ Undergraduate Students (degree-granting program at an accredited U.S. community college or four-year university)
 - ☐ Graduate Students
 - ☐ Educators
 - ☐ Must be a U.S. citizen
 - ☐ Students must be Full-Time and have a 3.0 GPA (on a 4.0 scale)

OSTEM Frequently Asked Questions

❖ Will Housing be provided if the Internship is In-Person

Interns are responsible for their own housing arrangements. Centers may offer minimal assistance by providing a list of local housing options and/or establishing a social media group for interns to utilize for relocation planning purposes.

❖ How do I know my application was received?

Once your application has been completed (indicated by green checkmarks), you can go to the section called “Submission Status.” Certify your application by clicking the green checkbox and clicking submit. You will see a message that says “Thank you for your submission!” Please do not call the office to confirm if they have received your application.

❖ How can I check the status of my application?

The system will notify you via email if you receive an offer. You may also log on into your application and go to “View My Offers” to view pending offers. Please refrain from emailing the help desk or contacting a NASA center about your application status. You will be contacted if you are considered for a project.

Office of STEM Engagement (OSTEM) Internship

- ❖ Apply at <https://intern.nasa.gov> to up to 15 opportunities per session

- ☐ Currently migrating to a new application system called “Gateway”

- ❖ Opportunities in Spring, Summer, and Fall

- ☐ Spring session is 16 weeks; Deadline 11/5/2021

- ❖ Not accepting applications for Spring 2022 until October 1, 2021.

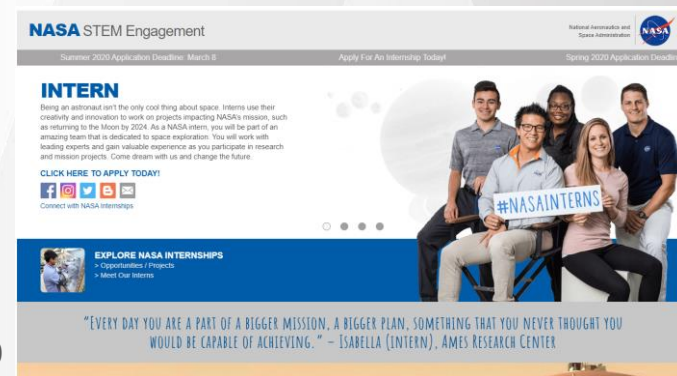
- ❖ Undergraduate stipend: \$11,680 Graduate stipend: \$14,400

- ☐ Summer session is 10 weeks; Deadline 3/4/2022

- ❖ Undergraduate stipend: \$7,300 Graduate stipend: \$9,000

- ☐ Fall session is 16 weeks; Deadline 7/8/2022

- ❖ Undergraduate stipend: \$11,680 Graduate stipend: \$14,400



Resume Tips: The Basics



1. Include your contact information (City, State, Zip Code)
2. Use a professional email address
3. Create a professional message on your voicemail
4. Check with your references before using their names
5. Check your spelling and grammar
6. Include all major education factors (GPA, graduation date, degree level, major, relevant coursework)

If in a dual-program, a community college student accepted to a bachelor's program, or an undergraduate accepted to a graduate program, include the dual/new program in resume.
7. Please make sure to read the entire vacancy.

Resume Tips: Stand Out

1. Work Experience (**you are not limited to 1 page for NASA**)
 - Document all related jobs
 - Use school projects if you lack job experience
 - Describe unrelated jobs the right way
2. Think like an employer (tailor your application to the position)
3. Federal resumes can be longer and require more information than private sector/non-profit resumes.

Important sections for STEM

- **Computer Skills:** Describe your knowledge of any computer skills, software languages, hardware, or any specialized computer programs.
- **Technical Skills:** Include any knowledge or capabilities to perform specialized tasks. This may include laboratory experience, special tools machine shop, etc.
- **Other Skills:** List any other skills needed. This includes soft skills (communication, leadership, teamwork, etc.)
- Previous NASA Program Experience
- List any NASA program experience – Space Grant





Resume Tips: Describing Your Experience

- Focus on the qualification requirements section of the vacancy announcement - your resume should describe how you meet the requirements
- Resume should be results driven - Use the S.A.R method: Describe the Situation, Action, and Result.
- Use action words to describe work experience: managed, assisted, responded, planned, coordinated, met with, implemented, communicated with, tested, developed, spearheaded, etc.
- Include special skills like computer proficiency and language ability
- Plan ahead - Allow plenty of time to thoroughly proof read and complete your application
- Apply by the deadline or better yet – early!

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NSTGRO Fellowships

NASA Space Technology Graduate Research Opportunities (NSTGRO)

- ❖ Provides tuition, research, and stipend support for both PhD students and Masters students
 - ❑ Up to 4 years eligibility for PhD students
 - ❑ Up to 2 years eligibility for Masters students
 - ❑ Health Insurance (\$2,500)
 - ❑ Faculty allowance – funds research and conference travel (\$11,000)
 - ❑ Annual stipend (\$36,000)
- ❖ Each NSTRGO fellow will be assigned a NASA research collaborator
- ❖ Fellows will complete a ~10 week visiting technologist experience (VTE) to a NASA Center, JPL, national lab, or other government lab
- ❖ Applicants must prepare a NASA-related research proposal and draft a personal statement
- ❖ Apply through NSPIRES (Deadline Nov 2nd):

<https://nspires.nasaprs.com/external/solicitations/solicitations!init.do?s=Future>

→ Search for NSTGRO

My Lessons Learned and Suggestions:

1. Look for activities outside of classes (clubs, extracurricular projects, service/volunteer activities, research positions, etc.) to build skills and gain leadership experience.
2. Invest time in developing your public speaking skills. Look for opportunities to present, such as school research symposiums, student conferences, toastmasters, etc. to master presentation techniques.
3. Actively search for opportunities and take a chance by applying even to opportunities (scholarships/grants, fellowships, internships, full time positions) you might consider a reach.
4. Have a positive attitude and actively engage with internships, research positions, and other learning opportunities. Use them to discover what your passion is.
5. Be confident in your abilities and beware of imposter syndrome.
6. Remember to network. Use resources like linkedin, conferences, etc. to engage with professionals in your field.



Questions?