Georgia Space Grant Consortium 2023 Annual Report









2023 IMPACT NUMBERS

The following numbers represent the direct student and community engagement throughout the state for the 2022-2023 academic year. All of the students, educators, and community members participated in a GSGC funded program.

Georgia Tech's Experimental Rocket team pictured at their July 2023 launch of their 2-stage sounding rocket "Material Girl" in the Mojave Desert in California.

WHO WE ARE

The Georgia Space Grant Consortium (GSGC) was established in 1989 to develop a statewide network of academic, industry, and non-profit partners dedicated to maximize the number of Georgia students from all backgrounds who are well-prepared in science, technology, engineering, and mathematics (STEM) fields and who are motivated to support space and aeronautics programs vital to this nation.

GSGC is a NASA program and part of the National Space Grant College and Fellowship Program. GSGC has 20 affiliate members and 9 partner organizations serving both metropolitan and rural areas of the state. The GSGC team includes 6 Historically Black Colleges and Universities and 2 women-serving institutions.

AFFILIATES:

- Agnes Scott College
- Albany State University
- Clark Atlanta University
- Columbus State University
- Fort Valley State University
- Georgia Institute of Technology
- Georgia Southern Univ.-Armstrong
- Georgia Southern Univ.-Statesboro
- Georgia State University
- Kennesaw State University
- Mercer University
- Morehouse College
- Museum of Aviation
- Savannah State University
- SpaceWorks Enterprises, Inc.
- Spelman College
- University of Georgia- Athens
- University of Georgia- Griffin
- University of North Georgia
- University of West Georgia

PARTNERS:

- Atlanta Metropolitan State College
- Center for Sustainable Communities
- Commodore Conyers College and Career Academy
- C-STAR
- Georgia Center for Innovation for Aerospace
- Hines Family Foundation
- PinkSTEM
- Scout Aerospace
- West Georgia Technical College

GSGC LEADERSHIP

Stephen Ruffin, PhD Director

Lori Skillings Program Manager

Alysia Watson Program Coordinator

Kelly Griendling, PhD Outreach Lead

STUDENT PROFILES

My name is Christopher Woolford and I am a fourth year undergraduate physics major at Kennesaw State University. I plan on completing a Ph.D. in physics and pursuing a career as a research scientist at a government research lab or university. I have taken part in several research projects and internships as an undergraduate to explore a career working in research and to prepare for graduate school, including positions as a research assistant at a particle physics lab (Fermi National Laboratory), a computational optics lab, and a deep learning lab.

I have been working with the Georgia Space Grant Consortium (GSGC) for the past two and half years and through opportunities advertised by the GSGC I was hired as an intern for the NASA Glenn Research Center (GRC). At the GRC, I worked with NASA scientists and engineers on exciting work in deep learning applications for material science. The GSGC helped me present my work in particle physics at the American Physical Society's April 2023 national meeting. Through the GSGC program at Kennesaw State, I have presented my work and talked about the opportunities I have encountered in STEM to students at various K-12 institutions across Georgia to help encourage them to pursue careers in STEM. The opportunities that GSGC has given me will help me on my path to graduate school and a future career as a research scientist in leading physics research and I hope to continue to work inspiring young minds to pursue STEM.

When I applied, I didn't realize how important the STEP high school summer camp at Georgia Tech would be. After everyone arrived, we went through initial introductions and icebreakers, during which I realized I was the only representative from my county. No one had heard of my school, and I was slightly intimidated at how experienced everyone seemed to be - but this dreadful feeling didn't last long. Soon, we were split into small groups and given the long-awaited task. We got the biggest sheet of white paper and were told to plan a mission to the surface of the moon and gather data from a moon base. The gears in my head started turning, and I began brainstorming immediately with my team. The next two weeks changed my life. The diverse community, ranging from robotics wizards to beginners like me, made for amazing collaboration and interesting experiences that gave me a headstart into the world of engineering. Every day brought new challenges. With every problem we solved, another one cropped up. We worked together in our groups, often asking other groups and our mentors for help. The unlimited access to resources and fun atmosphere made going through the engineering process quite enjoyable. Even outside of this, we were given the opportunity to explore the campus of Georgia Tech, giving me a chance to make some of the closest friends I have today.

The most impactful aspect of the program was a talk given by the guest speaker Ms. Nancy Conrad, who introduced us to the Conrad Challenge. It seemed like a fun but intense competition. Fueled by the momentum I had gained that previous week, I immediately made the decision to compete, and after a few hours of deliberating, was able to gather some of my new STEP friends to compete. I then asked Dr. Griendling to mentor us, and with her support, we ended up becoming alternate finalists and placed in the top 10 internationally for the aerospace engineering category. STEP started my journey in engineering, giving me the confidence and morale boost I needed. Whereas I was confused and feeling incapable, STEP gave me the opportunity to know that I too can participate in things that I used to think I wouldn't be able to.

The influence continued into my senior year. I became the first person in my school to take dual-enrollment courses at Georgia Tech and from there, I earned a spot in MITES Semester this past summer. Now, I have been admitted to Georgia Tech for aerospace engineering. I will be forever grateful for having such amazing opportunities now that I have the confidence I need to embark on the journey to my goals. STEP is so much more than just a summer program. Here, creativity and innovation come to life for students of all backgrounds and bring together those whom I would've never met otherwise. The close friends and mentors that I gained from this program were invaluable, and I'm still in touch with them today. The impact of those seemingly short 2 weeks has transformed my entire life, and for that, I am endlessly grateful. STEP single-handedly taught me that, in aerospace engineering, even the sky isn't the limit.

I am a 3rd year at the Georgia Institute of Technology pursuing a bachelors, and potentially a masters, in Aerospace Engineering. For the last year I have been involved the Georgia Space Grant Consortium researching Machine Learning and Artificial Intelligence related robotics and I have had the pleasure of teaching exceptional students across the Metro Atlanta area. Engaging with the organization has been immensely rewarding, as it has allowed me to contribute meaningfully to the local community. The opportunity to visit high schools and connect with exceptionally bright students has been a source of great joy and fulfillment for me. When I was first offered the under graduate researcher position with GSGC by Dr. Kelly Griendling, I was expecting to learn new skills and make new connections, but I soon discovered that it was going to be so much more rewarding. I began my journey by diving into the world of Jetson Nano, and now, a year later, I'm standing in front of a class full of talented high school seniors and juniors, sharing insights about Machine Learning.

My sincere appreciation goes out to the fantastic individuals I've had the privilege of connecting with through the Georgia Space Grant Consortium – their support has truly made a significant impact on my path. Through the GSGC I have been able to refine my leadership skills, vastly improve my coding skills, and most important of all, make an impact in the lives of many students eager to join the world of engineering. The goal of the project I am researching is to design a hands on learning curriculum to teach middle and high school students about neural networks and the utility of Machine Learning algorithms. Knowing that the work I am putting in will touch the lives of so many individuals, makes this become more than just a job, it gives me purpose beyond myself.

My name is Mason Caron, and I am a senior physics major at the University of West Georgia. My relationship with physics is a lifelong fascination, having become deeply invested in the natural sciences as a child, I've grown from skimming encyclopedias of science decades ago to fervently reviewing journal publications; a development attributable to the opportunities afforded to me by my research mentor, Dr. Ajith DeSilva, and the research we have been able to conduct with the help of the GSGC. My work is foundationally the operation of an atomic force microscope, and the subsequent computational analyses of data obtained. My experience on the atomic force microscope has been extremely gratifying, and it represents a crucial facet of my interests in morphological material properties. Using AFM technology, I have completed investigations in the porosity and morphology of metal oxide thin films including Flourine-Doped Tin Oxide, and Graphene-Doped Titanium Oxide, and in the spring of 2024 intend to conduct investigations into quantum dot structure as well as sub-surface comet-tailing in metal alloys using this technology.

Without the patience, trust, and guidance I have received from my mentors and department as well as the assistance of the GSGC, I would not have developed the experimental and computational skills that, today, have landed me a position on Southwire's Metallurgy team doing what I love in the industry I have always aspired to be in, and performing routine investigations into the properties and identifications of metals. Often there is a hesitancy in the sciences for students, even those conducting some of the most brilliant research in the world, to call themselves "scientists", however through the culmination of my efforts in research and the support I have received from such foundations as the GSGC, I am no longer hesitant, but proud, to call myself a "physicist"; and for that pleasure I have to thank Dr. Ajith DeSilva, Dr. Javier Hasbun, the University of West Georgia, and of course the GSGC.

Ever since I can remember, my dream has been to become an aerospace engineer. This dream set the course for my academic journey, which began at the University of North Georgia. Here, I pursued a Bachelor of Science in Physics with a minor in Computer Science, graduating in 2020. Eager to continue this trajectory, I advanced to the Georgia Institute of Technology, where I completed a Bachelor's in Aerospace Engineering in 2022 and am currently pursuing a Master's in the same field. My time at Georgia Tech marked the beginning of my deep dive into the world of plasma physics, starting with my research on Hall Thrusters at the High Power Electric Propulsion Laboratory.

My plasma journey reached a peak with my contributions to the development of a Magnetoplasmadynamic Thruster (MPDT) at Georgia Tech. This project thrust me into the realm of advanced research, dealing with mostly uncharted territory where theory is underdeveloped, and data is predominantly experimental. In this project, I took the lead in CAD 3D modeling and tackled critical instabilities, demonstrating my ability for innovative problemsolving and leadership in pioneering research.

In parallel with my academic and research pursuits is my deep-seated passion for volunteering and community engagement, particularly in the realm of STEM education. My active participation in various K-12 volunteer events, where I share my knowledge and enthusiasm for aerospace engineering, has been incredibly fulfilling. I have led initiatives such as GOT Space for the Georgia Space Grant Consortium and founded AeroAfroAstro, an organization aimed at supporting Black students in aerospace engineering. These efforts reflect my commitment to making STEM fields accessible and inclusive.

A highlight of this commitment was my role in organizing Space Day Atlanta 2023 at the Atlanta University Center's Woodruff Library. As a co-organizer, I was instrumental in bringing this event to life, with the goal of sparking a passion for STEM among local K-12 students. This free annual event, in collaboration with various institutions including the Hines Family Foundation and the Georgia Space Grant Consortium, provided an interactive platform for children and underscored the vital role of community in nurturing future scientists and engineers. Reflecting on my journey, which spans academic achievements, groundbreaking research, and community outreach, I see a path marked by continuous learning, innovation, and service. My military background, emphasizing discipline and teamwork, has reinforced my determination to make meaningful contributions to aerospace engineering and to inspire young minds to delve into the exciting world of space and science. My journey, interweaving academia, research, and volunteering, highlights a profound commitment to advancing knowledge and fostering a lifelong love for learning in others.

Ryan Kelley, Albany State University

The research I worked on was on the use of artificial materials to effectively block specific electromagnetic frequencies, and how different configurations block different frequencies. Specifically, how changes made to the material affected the frequency that is blocked. This is done by having small (<0.6cm), periodical cells containing specifically shaped copper elements printed on a 14" x 14" printed circuit board (PCB). We then tested said board by putting an empty PCB on top, as so it is symmetrical, which is then put in a device that sends a range of electromagnetic frequencies through the board and records the frequencies that pass through the material. The frequency blocked is determined by the dielectric constant of the materials and the capacitance of the copper elements. The signal hits the material, and resonates within the copper element, effectively blocking that specific frequency. The design of the copper elements was done using Ansys.

Words cannot effectively describe the value I have gained from engaging in this research. I've always been enthralled by the things we have achieved in aerospace. I wanted to be a part of it—of something bigger. That dream was never seen as a valid possibility, though. I thought research was exclusively for the smartest and most dedicated individuals. What we can do is limited majorly by what we think we can do. The possibility that I could achieve my dream of working in aerospace never crossed my mind. Now I see that with enough hard work, that dream is very well within reach. It's served, in a way, as a bridge between academia and the career field I hope to work in. For that reason, this experience has been invaluable for me. I'm not exactly sure where I would have ended up without this research, but I do know that it has pushed me to go beyond what I had previously anticipated. My plans for the future include graduate school and working in R&D in the aerospace sector. My horizons are now much further thanks to the Georgia Space Grant. I want to thank the Georgia Space Grant Consortium and Dr. Arun Saha of Albany State University for this eye-opening experience.

Trinity Smith, Columbus State University

I am a double major in astrophysics and biology student, pursuing a career in astrobiology at Columbus State University. This fall, I had the opportunity to intern at NASA Ames as part of a planetary protection project that has applications for future astrobiology missions. For the internship, I worked in a wet lab that tested the efficacy of laser sterilization on stress-tolerant bacteria.

During my time at NASA, I learned so much about myself in all aspects. I've gained invaluable knowledge and technical skills that have strengthened me as a biologist. I got to network and broaden my social skills by participating in conferences and meeting talented people who do fascinating research. I learned what ignites passion within me, what excites me, and what I need to work on.

With this new knowledge, I'm excited about what the future holds! After my undergraduate studies, I want to continue my education in graduate school to further my studies as an aspiring astrobiologist and participate in more exciting research. Being a NASA intern has opened many doors for me and taught me many beautiful things. I hope to do it again.

During my Internship through the Georgia Space Grant Consortium, I was partnered with Aubrey Silvey Enterprises, Inc. as an Engineering Intern. Aubrey Silvey Enterprises, Inc. is a high voltage substation design and construction company with a variety of customers nationwide. I had the privilege to work with the engineering team in the Engineer, Procure, Construct (EPC) Division. Silvey's EPC Division provides all aspects of substation design, and my responsibilities started in the electrical and physical design departments working with a team of engineers and designers.

In the early stages of this role, my expected duties were to learn major components of substations and their applications. After this process, I became increasingly involved with the electrical wiring layout for the protection relay panels of the substation. In summary, my day to day was familiarization and error checking the wiring schematics my supervisors had drafted into plans. My progression and responsibility were increased when I shifted from turning in marked up plans for correction, to being able to correct it at my level. The task assignment variation and turnover started to rise over time as I started to show efficiency. This experience was a marker in growth and trust at the technical level, which makes for a more rewarding experience overall.

Through this experience I have gained new strengths that cannot be obtained through just the challenges faced in schooling. In the workplace environment I have gained teamwork and communication skills for real world projects where the number of people involved is far greater than you find in most schools. One major factor is working for deadlines that affect an entire team, equating to a more fulfilling experience overall. These moments and growth points are the most rewarding part of my involvement and opportunities that the Georgia Space Grant Consortium has been able to provide for me.

Due to my exposure and participation with the Georgia Space Grant Consortium I have accepted a part time position with Aubrey Silvey Enterprises as a Physical Design Intern. I do plan to transition to a position full time upon graduation from West Georgia Technical College in the spring. Aside from helping students gain employment, the experiences I have received through this grant have been extremely rewarding. Past, present, and future students who are involved with the Georgia Space Grant Consortium can be expected to possess skills and qualities that are comparatively greater of those in their graduating class.

IMPACT THIS YEAR

Agnes Scott College: Agnes Scott College NASA Scholars

The astronomy outreach program at Bradley Observatory consists of two parts: K-12 Outreach and Open House Series. The K-12 Outreach program, which has been active for over 25 years, was restarted after a

temporary hiatus during the recent pandemic. The program relies heavily on student volunteers, including work-study students who dedicated part of their weekly hours to hosting school groups. A student Observatory Outreach Fellow managed the program, overseeing outreach activities, creating and maintaining materials, and surveying visiting teachers for feedback. The Open House Lecture Series 2022-23, including Equinox Concerts and Open House Lecture Series, was overseen by Observatory Directors Dr. Amy Lovell and Dr. Alexandra Yep, and a student Observatory Open House Coordinator. The lecture series featured

six astronomy-themed lectures and two astronomy-themed concerts in the Planetarium. These events, which were free and open to the public, attracted large crowds, with 100-150 attendees per event enjoying astronomy speakers, telescopes, and planetarium shows. People love our astronomy speakers, lawn telescopes, vintage 30-inch telescopes, and planetarium shows.

Agnes Scott College: Back to the Planetarium! Restarting Astronomy Outreach

The Agnes Scott NASA Scholar award recognizes excellence in astronomy research and outreach. In 2022-2023, two annual scholarships were awarded, one for astronomy outreach (NASA Outreach Scholar) and the other for astronomy research (NASA Research Scholar). These scholarships aimed to increase the number and diversity of astronomy and physics majors, prepare graduates for STEM careers, and highlight research and outreach in NASA's mission. 2022-2023 Scholars include: Research Scholar, Tien Nguyen for black hole research; and Research Scholars, Cara Ebers and Ansley Aufiero, for astronomy outreach at the Bradley Observatory. Tien and Cara presented their work at the Spring Annual Research Conference (SpARC) in April 2023. Over 90% of previous awardees have pursued science/mathematics teaching or entered graduate programs.

Albany State University: Experimental Verification of Enhancement in Material Dielectric Constant with Metal Patches

Albany State University's Experimental Verification of Enhancement in Material Dielectric Constant with Metal Patches program provides undergraduate students the opportunity to gain valuable research expertise using a Vector Network Analyzer (VNA), a state-of-the-art test instrument. During the 2022-2023 year, four students successfully simulated, designed, and assisted in the fabrication of material samples.

According to previous research it was shown by simulation that the dielectric constant of a material could be enhanced by adding metal patterns on it. In this project, experiments were conducted to demonstrate the enhancement of dielectric constant with circular metal patches of various diameter printed on the host material. Experimental results showed that material dielectric constant increased with the increase in metal patch diameter and theoretically any value of dielectric constant could be achieved by adjusting the size of the metal patches.

Research outcome was published in a peer reviewed IEEE conference proceedings and was co-authored by one of the four students: Arun K. Saha, Walker G. Pendleton, "Enhancement of Relative Permittivity of Material with Metallic Inclusions", Proceedings of IEEE SouthEastCon, April 2023.

Clark Atlanta University: Clark Atlanta University Fellows

The Department of Mathematical Sciences at Clark Atlanta University developed a fellowship opportunity for undergraduate studies leading to a master's or doctoral degree in science, technology, engineering, or

mathematics (STEM). One year of support is provided by the program for one or two highly qualified students that demonstrate leadership and passion in advancing a community of underrepresented minorities in STEM. Through this program, a connection is created to engage underrepresented pre-college students in earth science research, data science research or exploratory learning opportunities leading to STEM literacy and the awareness of NASA's programs. Establishing this connection and innovative activities facilitates STEM awareness among a vulnerable population. Through positive interactions, we plan to motivate underrepresented minority students to

enter college and pursue a STEM degree. A subsequent consequence of this program is a deeper relationship between students at a local school and Clark Atlanta University representatives. The goal of the project is to provide financial support for one or two fellows motivated to serve as ambassadors by cultivating healthy relationships between representatives at Clark Atlanta University and a local school through the creation of intellectually stimulating engagement opportunities for K-12 students.

Columbus State University: Undergraduate Engagement in Hands-On Observing, Instrumental, and Research Projects at CSU

Provided one graduate fellowship to a graduate student in Natural Science (Geology) (Spring 2023) and ten undergraduate scholarships to undergraduate students in Earth and Space Science (Astrophysics & Planetary Geology track) (3 in Fall 2022, 8 in Spring 2023 with 1 continuing from Fall 2022).

The graduate student (Ivy Do) worked on NASA-related projects at the CSU's WestRock Observatory to optimize the telescopes, use the facilities for educational projects with a faculty mentor, and mentor undergraduate students. This fellowship was instrumental in allowing this student to begin graduate studies in planetary geology at CSU, and she has now gone on to a CSU-funded assistantship.

The three undergraduates in Fall 2022 were supported via "Faculty-Mentored Research" scholarships for completing a research project under the guidance of a faculty member. All three students worked with Dr. Rosa Williams on a Faculty-Mentored project searching for signatures in supernova remnants in new optical data, and checking for counterparts to any candidates in X-ray and radio observations. Two of these students graduated at the end of Fall 2022 (Sharmaine Motin, Devin Janeway).

One of these graduates has accepted a position at the Marshall Space Flight Center as an Operations

Controller (Devin Janeway); while the other is applying to internships via NASA's Recent Graduates Program. The third (Kayleen Linge) continued to work on the project in Spring 2023. Of the eight undergraduates in Spring 2023, four were supported via "Faculty-Mentored Research" scholarships for the research project with Dr. Rosa Williams as mentioned above.

One student (Kayleen Linge) continued on the project from the previous semester, while three more joined the ongoing research. At the end of the semester they presented their results, including 6 possible candidate remnants, at CSU's "Tower Day" undergraduate research program.

Three of the students (Joy Flowers, Samuel Kimball, Kayleen Linge) have applied to continue the research in Fall 2023, while the fourth graduated that semester and is now seeking NASA-related employment (A'naja Houston). The other four undergraduates from Spring 2023 were supported via "Hands-On Observing" scholarships. These students learned to use telescopes, equipment, and data analysis software in the WestRock Observatory for solar and night observations, under the guidance of Michael Johnson and the graduate student above (Ivy Do). They were also allowed time for their own independent observations, under Ivy Do's supervision. These students completed a reflection on their accomplishments in the program and how these will inform their careers. All four (Alec Goldsmith, Evan Mathis, Britney Blaire Enfinger, Griffin Mcleroy) remain with the Earth and Space Sciences major and Astrophysics & Planetary Geology track, with one (Griffin McLeroy) having applied to join the research project above in Fall 2023.

Georgia Southern University - Armstrong Campus: Eagle Engineering Ambassadors Program

The Eagle Engineering Ambassadors (EEA) Program, developed in Fall 2022 and launched in Spring 2023 at

Georgia Southern University's Armstrong Campus in Savannah, Georgia, successfully exposed a diverse group of local area high school students and teachers to engineering concepts and careers through engineering projects within a mentoring framework. This mentorship-based program engaged seven area high schools, including six from Chatham County and one from Bryan County. Among the participating schools were a mix of private, charter, and public institutions, with two public schools having

a significant representation of underrepresented student groups.

During Spring 2023, the high

school teams collaborated on engineering projects, including design prototyping using CAD and 3D printing, automatic watering systems, autonomous robots, and DC motor/fan control. These hands-on experiences were guided by Georgia Southern engineering students (Ambassadors), who mentored and coordinated the high school teams. Weekly visits ensured progress and provided valuable guidance.

In total, 62 high school students, seven high school STEM teachers, and 10 Georgia Southern engineering students participated in the EEA program. Additionally, the program organized three high school field trips to Georgia Southern's Armstrong campus, where 85 students and 3 teachers participated in half-day engineering activities and explored the campus engineering labs. Notably, one of these visits was co-organized with the Boy Scouts Engineering Explorer Post, Savannah.

Georgia Institute of Technology: Small Satellite Design Lab

The Georgia Tech Small Sat Design lab has been developing CubeSat sub-systems with a team of undergraduate students. In the past year, we designed a structure and several new subsystems. In 2022, a 1U CubeSat designed and built by students was deployed into orbit from the International Space Station. Amateur radio operators around the world communicated with this satellite for several months until it re-entered the Earth's atmosphere in late

2022. Our program has engaged over 30 undergraduate students at Georgia Tech, providing them with the opportunity to work on space flight projects.

Georgia Institute of Technology: NASA ML- BOTS

The Georgia Space Grant Consortium (GSGC), in conjunction with its partners, Mercer University, Morehouse College, Hines Family Foundation, the Alabama Space grant Consortium, University of Tennessee Chatanooga, LaSTEM are developing the NASA ML-Bots program, a STEM learning experience designed to teach and inspire by teaching coding and Artificial Intelligence (AI) and Machine Learning (ML) basics to students in grades 6-12.

Lessons, learning tools, and real project-based learning activities will be introduced using guided hands-on learning experiences appropriate for the middle and high school levels. NASA ML-Bots includes learning situations whereby students can learn to integrate and apply AI/ML products, processes, tools, and systems to specific scenarios relevant to Artemis III Human and Robotic Surface and vicinity operations, and autonomous and/or semi-autonomous command, control, and communications from earth-based ground operators.

NASA ML-Bots aims to increase access to opportunities for underrepresented and underserved students in the highdemand and high-paying fields of artificial intelligence and

machine learning that are critical to NASA's future autonomous systems and the modern STEM workforce. These skills are already in high-demand, and it will serve both the students and the industry to equip the next generation with the skills they need to succeed in this area. The final challenge problem in NASA ML-Bots will specifically draw inspiration from NASA's Artemis Lunar Exploration Mission Program in the Exploration Systems Development Mission Directorate, helping to inspire students to envision their possible future careers at NASA and in related STEM fields while simultaneously giving them a set of tools and experiences that can help them achieve those dreams. This 3-year program is focused on developing the content and deploying it in partnered states in the southeastern US.

Georgia Space Grant Affiliate Network: Space Day Atlanta

During World Space Week 2022 the Georgia Space Grant partnered with the Atlanta University Center Data Science Initiative, Morehouse College, Mercer Universityand the Hines Family Foundation to host Space Day Atlanta at the AUC. The second annual event was geared toward inspiring the next generation of students to get involved with STEM. During the event, K-12 students and the community engaged with student volunteers at various booths showcasing different STEM fields, demonstrations, and other hands-on activities, these activities were aeronautics or aerospace themed. During lunch, participants

engaged in a talk and Q&A with special guest, NASA Astronaut Dr. Yvonne Cagle.

Georgia Institute of Technology: Science, Technology, and Engineering Program

The Georgia Tech Aerospace Engineering Science, Technology, and Engineering Program (STEP) program is a high-impact summer program for rising high school juniors and seniors. The two-week immersion program

creates meaningful, high-impact experiences for students interested in pursuing STEM. Georgia students work open-ended design challenges inspired by active Georgia Tech research. In summer 2023, leveraging the outreach support within other GT AE federal programs, as well as industry partnerships, GT Aerospace and the Georgia Space Grant Consortium hosted two summer workshops. One workshop was hosted at Georgia Tech's School of Aerospace Engineering department in Atlanta, Georgia, while the second took place at parnter site, Commodore Conyers College and Career (4C Academy) in Albany, Georgia.

During the Atlanta, GA workshop, students were challenged to design a rover prototype with a specific mission in mind on either the surface of the Moon or Mars. Then they employed the engineering design process to

map out their plan of execution to construct their prototype from various readily available materials and supplies. The students completed these open-ended challenges as a team where they worked together alongside Georgia Tech Undergraduate mentors to troubleshoot issues and create solutions to design flaws.

During the Albany, GA workshop, students were challenged to "envision a way in which small, unmanned air systems can support your community and design, build, and test a prototype of that vehicle." Projects tie aerospace research areas including design, controls, autonomy and robotics, and human factors. Students conclude by giving presentations

to an industry panel.

STEP provides students a valuable opportunity that boosts their college applications and provides foundational skills. STEP targets a diverse population of students in under-served rural and urban communities. The STEP class of 2023 included 37% free/ reduced lunch students, 34% black students, 25% Hispanic students, American Indian/Alaska Native students, Hawaiian/Pacific Islander students, and 42% female students. These students came from 39 different schools in the metro-Atlanta area and 4 high schools in the Albany, GA region.

Students have spoken about the confidence that they have gained from STEP and how STEP has inspired them to pursue opportunities they previously believed were out of their reach. In recent years several STEP students have been accepted at Georgia Tech. Other students have gone on to mentor for First Robotics. During Fall 2022, a team from the 2022 STEP cohort formed a team to compete in the 2022 Conrad Challenge, sponsored by the Georgia Space Grant Consortium. The team placed in the top 10 internationally. The impacts of the STEP program are long lasting for the students that attend. Many students maintain contact with program administrators about their accomplishments well into their college and careers. Many of them keep in touch with other participants from their STEP class and collaborate with each other beyond the end of the program.

Hines Family Foundation: A-MASST 23 (ASSETS Multi-university Artemis Student SmallSat TestBed)

The A-MASST23 project provides a dynamic, multi-university platform for undergraduate and graduate students to engage in hands-on experiences integrating foundational technologies with aerospace engineering and small satellite lifecycle product development. A-MASST23 represents an evolution of the original Artemis Smallsat Systems and Exploration Technologies for STEM (ASSETS) project.

A-MASST23 focused on enhancing the capabilities of the A-MASST team in developing and operating an integrated, modular 2-6U nanosatellite platform for NASA relevant

technology demonstration objectives. This iteration of the program builds upon the foundation laid by the collaborative Image Capture and Observation Nanosatellite for IoT and Climate (ICONIC) Space Mission applications from the previous summer, as well as leveraged resources from the NASA STMD SSTP Experiential Smallsat Workgroup (ESW) program.

A key aspect of A-MASST23 is its commitment to inclusivity, aiming to involve students and teams from underserved and underrepresented communities, with a particular focus on women, ethnic minorities, and individuals with disabilities. By providing access to cutting-edge technology and real-world project experiences, A-MASST23 empowers students to contribute meaningfully to Earth and Climate Science Imaging, IoT networks, and future multidisciplinary Artemis-era Lunar Mission programs, fostering a diverse and skilled workforce for the aerospace industry of tomorrow.

Museum of Aviation Foundation: LIVE: STEM Field Trips

The Museum of Aviation Foundation's National STEM Academy (NSA) to educates, engages, and inspires students and educators in STEM through various programs. These include on-site STEM Field Trips, school outreach, and virtual STEM trips from August 2022 to May 2023. The focus is on reaching minority, underrepresented, rural, and urban areas in Georgia. The STEM Field Trips cater to PK-12th grade students and teachers, offering programs like Wonder Wings for Pre-K, ACE Plus for K-5th grades, and Mission Quest Plus for 6th-12th grades. These trips align with NASA Mission Directorates, supporting research in space life science, physical science, earth science, and planetary science.

Mercer University - Atlanta: A two-week STARBASE ROBINS STEM Adventures Summer Academy

Mercer University Tift College of Education faculty and graduate researchers coordinated with the Warner Robins –STARBASE program, the Georgia Association of Conservation Districts (GACD), and the Hines Family

Foundation (HFF) to develop a summer camp for middle school girls and boys in Georgia that focused on introducing students to climate science and agriculture (ag-tech). The camp demonstrated how climate science and ag-tech can be applied in space and on earth to solve problems. The participants engaged directly in science and engineering practices and worked in teams to engage in problem-based learning challenges. The focus of the camp was to create a place for middle school-aged girls and boys to actively engage in STEM activities related to space, conservation, and agriculture. The participants were exposed to

STEM careers as a means of developing their interest in pursuing positions in the future. Professionals and students with related college majors interacted with the camp participants to provide positive mentorship.

Kennesaw State University: Applied Leadership and K-12 Outreach

These two overlapping programs emphasize cultivating student leadership within STEM fields, fostering undergraduate engagement in research endeavors, facilitating the dissemination of findings through conference presentations and publications, while simultaneously engaging in the design and execution of K-12 outreach workshops and hands-on activities for local area students. Outreach efforts primarily target high school students in Cobb, Paulding, and most recently Cherokee County.

Participating KSU students are encouraged to pursue STEM careers post-graduation, with their placements in graduate or professional schools and industry internships serving as key metrics for program effectiveness. Over 15-20 undergraduate students across diverse STEM disciplines benefit from these initiatives annually. Notably, our programs have engaged students from Physics, Chemistry, Biology, Math, Computer Science, and Cyber Security departments.

KSU students join the program in their first or second year and generally remain involved through graduation. Over the last 7 years, the program has involved over 50 KSU undergraduates,

the majority of which are women or members of underrepresented minorities in STEM. These students have collectively authored 50+ journal articles and/or national conference presentations for which they have received multiple awards including the Goldwater Scholarship. They have collectively received over 10 industry internships and/or permanent job placements including at leading companies such as Delta, AIG, Morgan Stanley, and Microsoft. Over 10 of the participating students were admitted to graduate school programs in their respective STEM disciplines, including at Georgia Tech, University of Georgia, Johns Hopkins, and Vanderbilt. Multiple graduates from the program have also been accepted to medical school, including at Morehouse and Mercer Schools of Medicine.

Museum of Aviation Foundation: STEM LIVE: Virtual & Onsite STEM Educator Workshop Series

The STEM LIVE: Virtual & Onsite STEM Educator Workshop Series provides hands-on professional development

for Georgia K-12 educators with NASA content and resources to provide educators with learning experiences that build critical instructional STEM skills to better prepare their students for STEM careers. This year's theme was The Artemis Generation. Workshops demonstrated NASA instructional products related to STEM disciplines so that educators can easily infuse the support materials into classroom curricula. Workshop demonstrations also introduced educational

technologies such as the NASA Portal and web sites, NASA social media and NASA Apps and Challenges. Additionally, there was a focus on incorporating into all workshops Literacy and Cultural Diversity and how readily available NASA resources can support their Georgia standards lesson plans.

PinkSTEM Foundation Inc.: A3, Aerospace, Aviate, Aspire

PinkSTEM, Inc., a non-profit organization dedicated to building awareness and attracting girls to aviation and other STEM careers, successfully hosted its third annual A3 Convention, "Aviate. Aerospace. Aspire," at NASA's Kennedy Space Center. Students aged 5 to 18 engaged in activities that introduced them to various aviation and aerospace careers. Activities included flying in a flight simulator, building an airport, speaking with roles models in aviation and aerospace careers, a special demonstration on NASA's Artemis Mission to the Moon, and much more. Scholarships provided eligible students an opportunity to attend this otherwise inaccessible experience. Three former A3 participants are now pursuing undergraduate degrees in Aviation, Aerospace and Biomedical Engineering.

SpaceWorks Enterprises, Inc: SpaceWorks Engineering Internships

SpaceWorks Enterprises, Inc., is an aerospace-focused research and development firm located in Atlanta, GA, that specializes in engineering design services, insightful market research, innovative software development,

and cutting-edge hardware products. Our current government and commercial product line includes hypersonic test vehicles, Low-Earth Orbit (LEO) reentry vehicles, rocketpowered propulsion vehicles, spacecraft docking devices, and custom commercial software modeling tools for trajectory, vehicle flight analysis, ramjet and scramjet engine design, and design for liquid rocket engines. GSGC SpaceWorks Internships are paid internships at our Atlanta facility, offering college students real-world exposure to the aerospace

industry. Interns work alongside our engineering team to analyze and assess challenging technical problems and pursue opportunities related to human exploration, future space missions, and space commerce. This experience allows them to apply the knowledge they have gained in the classroom to better understand the impact that they can make on tangible challenges. University of Georgia - Griffin Campus: Remote Sensing Evaluation of Evapotranspiration and Temperature of Pecan Trees

The environmental physics program located on the UGA Griffin Campus is unique in the state. This program develops sustainable climate-smart practices to identify the optimum use of crop water use in water stress and thermal stress conditions. Through the integration of affordable airborne remote sensing technologies and eddy-covariance measurements, the program empowers growers with enhanced decision-making capabilities. Utilizing tools such as infrared radiometers and drone-mounted multispectral cameras, we assess the thermal and water status of crops, aiding in precise water management throughout the growing

season. Led by esteemed UGA Regents Professor, Dr. Monique LeClerc, UGA STEM students involved in program receive comprehensive training in all facets of this technology, from fundamental principles to field deployment and data processing. The program synergizes multiple measurement systems, including eddy-covariance, weather stations, sap flow systems, and soil monitoring, to comprehensively understand the interaction between climate and crops., the program embodies excellence in research and education, with a focus on bridging knowledge gaps in underserved rural communities.

University of Georgia - Griffin Campus: Application of aerial multispectral imagery in early detection of Tomato Spot Wilt Virus

Located on the UGA Griffin Campus, this graduate research program provides a combination of both new

and affordable technologies, including drone and GPS, with sophisticated atmospheric turbulent flux measurement methods, to create advanced training in multiple on-the-farm applications including the detection of early diseases on the farm and water stress monitoring. This program fosters the development of women STEM students through training and developing proficiency in flying the drone/multispectral camera/associated postexperiment signal processing/ data analysis. The program seeks to teach and empower women STEM students to develop more environmentally friendly management practices in agriculture across the state, particularly in rural,

often overlooked areas. Future collaborations with GSGC affiliates Fort Valley State and Mercer Universities will deepen access to faculty at these institutions and to contacts in more rural areas across the state.

University of Georgia: Small Satellite Research Laboratory

Small Satellite Research Lab (SSRL) at the University of Georgia aims "to teach, to develop, and to discover" space science and technology through undergraduate and graduate student involvement. For years to come, SSRL expects to continue: "teaching" students how to build and use space ready instruments; "developing" the community by getting K-12 students interested in both space science and exploration and University education; and "discovering", by using space-based instruments to observe phenomenon on Earth from an orbital perspective.

University of North Georgia: The North Georgia Space Grant Fellowship

The North Georgia Space Grant Fellowship program awards monetary prizes to students who show exceptional promise in STEM fields. The program awards eight fellowships with two recipients coming from each class (freshman, sophomore, junior and senior). Academic prowess in physics and related fields as well as interest and research in the space sciences are considered in the award process. Special consideration is also given to provide support to deserving underrepresented populations.

University of West Georgia: Astronomy Research

This program provided hourly wages for two undergraduate students at the University of West Georgia (UWG) who are members of underrepresented groups in physics and astronomy (female, LGBTQIA+). The students analyzed near-infrared spectra of planetary nebulae, the ionized ejecta of dying 1-8 solar mass stars, to study s-process enrichments of neutroncapture elements (atomic number Z > 30). The data were obtained with the 3-meter NASA Infrared Telescope Facility and the 10-meter Hobby Eberly Telescope, and probe poorlystudied spectral regions in emission line objects. Transitions of several neutron-capture elements (e.g., Br, Rb, Te, and Xe) were

detected. The students presented results at the 2022 GRAM and/or CUWIP 2023. One paper on the findings was submitted for publication in fall 2023, with plans to submit another in 2024.

West Georgia Technical College: Engineering Technology Internships

The program provided West GA Technical College two-year Associate of Applied Science Degree (AAS) in Engineering Technology (with specializations in Electrical, Industrial, and Mechanical) students with the opportunity to explore professional engineering careers. Two WGTC students gained valuable onsite industry experiences via internships with partner organizations E.G.O North America in Newnan, GA and Aubrey Silvey Enterprises Inc. in Carrollton, GA. Partcipants became qualified engineering technicians

specialized in mechanical, electrical, or industrial engineering technology, seeking entry-level positions in various industrial or manufacturing fields.

University of West Georgia: Sustainable Nanostructured Optoelectronics Research and Promoting STEM Education

A University of West Georgia undergraduate research project that provides undergraduate research opportunities in Physics focused on enhancing nanostructured electronic devices by incorporating specific molecular species into heterojunction interfaces, improving charge transfer and device performance. We prioritize designing, fabricating, and characterizing solar cells, thermoelectric generators, and photonic devices using nano-

composites of TiO2, CuI, CuSCN, perovskites, Alq3, and others. The aim is to improve sustainable energy conversion and photonic devices cost-effectively, which keenly aligns with NASA's interests in nanomaterials and space-ready devices. In addition to research, the team engaged in K-12 outreach with local area schools. This project reflects the University of West Georgia's strategic focus on transformative research and student-centric approaches.

GSGC Sponsored NASA Center Internships:

Sarah Schoenbaum Georgia Institute of Technology Ames Research Center, Fall 2022

Kimberly Stringer Georgia Institute of Technology Johnson Space Center, Spring 2023

Niha Yendamuri Georgia Institute of Technology Jet Propulsion Lab, Summer 2023

Natalia Geraldino Arango Georgia Institute of Technology Marshal Space Flight Center, Summer 2023

Alfonso Bravo Georgia Institute of Technology Ames Research Center, Summer 2023 *Sarah Yandell* Savannah College of Art and Design Johnson Space Center, Summer 2023

Rohan Parnerkar Georgia institute of Technology Ames Research Center, Summer 2023

Grant Ewing Georgia Institute of Technology Ames Research Center, Summer 2023

Cameron Eure Georgia Institute of Technology Ames Research Center, Summer 2023

STATEWIDE NETWORK:

GSGC has an large network of Affiliates and Partners throughout the state. GSGC continually stives to expand the network to reach more Georgia Residents each year.

The sky is no longer the limit. Reach for the moon, Mars, and beyond!

