

**75th ANNUAL SOUTHEASTERN
REGIONAL STUDENT CONFERENCE
APRIL 4-5, 2024**

**Center for Space Education
Kennedy Space Center
Cape Canaveral, Florida**

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AIAA 75th ANNUAL SOUTHEASTERN REGIONAL STUDENT CONFERENCE

AIAA

CONTRIBUTORS

Thanks are offered to those companies, groups, universities and individuals whose financial assistance, equipment, and/or services made this conference possible.

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ACKNOWLEDGEMENTS

The AIAA Region II Sections are now in their sixty-ninth year of participation in sponsoring the Southeastern Regional Student Conference. Special thanks to all of the volunteers on the Region II Student Conference Committee, the faculty advisors, the on-site judges, and the technical paper judges.



Thanks to the AIAA Foundation and Lockheed Martin for their generous financial support of all of the AIAA Regional Student Conferences. The AIAA Foundation provides award funding for the technical paper presentations in the undergraduate, masters, and team categories.



The hosts for the 2024 Southeastern Regional Student Conference are the AIAA Student Branches from the Florida Institute of Technology and the University of Florida.

Host School Student Conference Coordinators

Jaxon Strank (FIT)
Whitney Reinkoester (FIT)
Wyatt Cross (UF)

Host School Faculty Advisors

Dr. Paula do Vale Pereira (FIT)
Dr. Rick Lind (UF)

Sponsors

Location: Conference Center

Several sponsors will be onsite Thursday throughout the day. They will be available to discuss opportunities and programs with student attendees. This is a great opportunity to grow your professional network. Please stop by as your schedule allows on Monday.



Wednesday Night Social

Location: Radisson Resort at the Port

Join us at the Radisson between 4:00 PM and 10:00 PM for an exciting evening of friendly competition and networking. Test your skills through aerospace-themed challenges. Engage with professionals and students from various universities in a relaxed atmosphere. Don't miss this opportunity to showcase your talents and connect with fellow enthusiasts!

Thursday Night Event

Location: Radisson Resort at the Port

Come join us for social bingo! Meet in the lobby and pool area of the Radisson from 7:00 pm - 9:00 pm to play social bingo and to meet other students and aerospace professionals. This is a casual event, so feel free to change into more comfortable clothing which will allow you to relax and unwind in the wonderful outdoor space the Radisson has to offer.

8:15 AM Keynote
Joe Bussenger, Director of Launch Operations
Relativity Space

Undergraduate — Location: Room 7010

9:00 AM "Creating Velocity Wells in a Vertical Wind Tunnel"; Emma Ferber ; University of Tennessee

9:30 AM "Active Control and Guidance-Aided Propulsive Landing Research for Small-Scale Vehicles"; Cheng Liu; Georgia Institute of Technology

10:00 AM "A Validation of FlightStream for Store-Separation Modeling"; Matthew Campbell; Auburn University

10:30 AM Intermission

10:45 AM "Fabrication of Temperature Sensitive Paint Applied to Polyvinyl-Chloride Adhesive Films for Global Surface Temperature and Heat Flux Measurements"; Sophia Edwards; Rachel Constantin; University of Tennessee

11:15 AM "The Application of Phase Sensitive Detection in High-Resolution Acoustic Measurements"; Tymur Tkachenko; Georgia Institute of Technology

11:45 AM "Design and In-house Manufacturing Dynamics of a Modular RDE at NCSU"; Kierra Shook; Ben Delgado; North Carolina State University

12:15 PM "Lunar Dash: A Board Game for Aerospace STEM Education"; Jacob Pence; Brooklyn Schnupp; University of Georgia

Teams — Location: Room 9020 Artemis Arena

9:00 AM "Investigation of Interlaminar Fracture Toughness of Additively Manufactured Composites Using Response Surface Methodology"; a team project by Mississippi State University

9:30 AM "Experimental Validation of a Novel Wind Turbine Blade Power Optimization Methodology for Skewed Fluid Flow"; a team project by North Carolina State University

10:00 AM "Magnetic Field Mapper Using Commercial Off the Shelf Components and Labview Software"; a team project by Georgia Institute of Technology

10:30 AM Intermission

10:45 AM "Update on the Student Development of a Liquid Bipropellant Rocket Engine"; a team project by University of Alabama in Huntsville

11:15 AM "Wildfire Detection Testing for UAVs and CubeSats"; a team project by Mississippi State University

11:45 AM "Lessons Learned from the Launch of a Student-Built LOX/Jet-A Sounding Rocket"; a team project by Georgia Institute of Technology

12:15 PM "The Design of a Suborbital, Payload Delivering Model Rocket"; a team project by University of South Carolina



12:45 PM—2:00 PM Luncheon
Location: Conference Center
Speaker: Bill "Roto" Reuter, President
R-Squared Solutions, LLC

Undergraduate — Room 7010

2:15 PM "Design and operation of a supercritical water oxidation reactor for waste-water reclamation during long duration space flight"; Victor Dubceac; University of South Carolina

2:45 PM "Assembly and Testing of Additively Manufactured Cold-Gas Propulsion Systems for the VIRTUAL Super-Resolution Optics Using Reconfigurable Swarms (VISORS) Mission"; Ethan Traub; Althea Noonan; Georgia Institute of Technology

3:15 PM "Effects of Nanoparticles and Surfactant on Raindrop Behavior"; Connor Traynor; Joshua Watkins; University of Tennessee

3:45 PM Intermission

4:00 PM "Quick Link: A NAR Level 2 Certification Rocket"; Nathan Tardy; Florida Institute of Technology

4:30 PM "Machine-Learning-Based Wind Detection and Avoidance Using a Crazyflie Micro Drone"; Kyle VanHorn; University of North Carolina - Charlotte

5:00 PM "Uncertainty Quantification of Operating Conditions on the Structure of Turbulent Premixed Flames using Non-Intrusive Surrogate Modeling Strategy"; David Brown; University of Tennessee at Chattanooga

Teams — Location: Room 9020 Artemis Arena

2:15 PM "Design of a Stability System to Secure a Mobile Liquid Rocket Test Stand"; a team project by University of Alabama in Huntsville

2:45 PM "Design and development of a hybrid rocket engine test stand to study exhaust flow gas dynamics and chemical kinetics"; a team project by Louisiana State University

3:15 PM "Drop Test Campaign of Sounding Rocket Recovery System"; a team project by Georgia Institute of Technology

3:45 PM Intermission

4:00 PM "Strength Characterization of Thermally Cycled 3D Stitched Composites Using Response Surface Methodology"; a team project by Mississippi State University

4:30 PM "Liquid Bipropellant Rocket Design"; a team project by Florida Institute of Technology

5:00 PM "Exploring Operability and Design Characteristics of a Small-Scale Methane/Oxygen Jet-in-Crossflow Rotating Detonation Engine"; a team project by University of Central Florida

8:15 AM Keynote
Joe Bussenger, Director of Launch Operations
Relativity Space

Open Topic — Location: Room 1000 Exploration Station

- 9:00 AM "Urban Air Mobility (UAM); Implementation & Feasibility"; Michael Hakim; Georgia Institute of Technology
- 9:30 AM "Low Cost Materials for Thermoplastic Composite Tooling"; Michael Cargill; Alberto Diaz; University of South Carolina
- 10:00 AM "Survey of Aerospike and Aerodisk Technologies for Drag Reduction at Hypersonic Speeds"; Laura Garzon; University of Florida

10:30 AM Intermission

- 10:45 AM "Using Artificial Neural Networks to Calculate Lift Coefficients for an Unknown Airfoil"; Sophia Cherry; Karissa Hawk; Florida Institute of Technology
- 11:15 AM "Arc Jet Ground Testing for Hypersonic Vehicles and Spacecraft"; Cole Perry; University of Tennessee
- 11:45 AM "Managing Safety Hazards In The Preliminary Design Phase of a Student-Lead Liquid Rocketry Program"; Michael Johns; University of Alabama in Huntsville
- 12:15 PM "Unlocking New Horizons: The Role of Kenya's Broglio Space Center in the Commercial Space Era"; Kurt Gugelev-Shapiro; Georgia Institute of Technology

Masters — Location: Room 7030

- 9:00 AM "Combustion Dynamics and Thermal Characterization of a Small LOX/LCH4 Engine for Future Lunar Lander Application"; Austin Morse; Pilar Gonzalez; University of Alabama in Huntsville
- 9:30 AM "A Priori Assessment of the Two-Level Simulation Model for Simulation of Turbulent Non-Premixed Flames"; Robert Smith; University of Tennessee at Chattanooga
- 10:00 AM "Structural Health Monitoring for Launch Vehicle Reusability Using Fiber Bragg Grating Written Optical Fiber"; Thomas Colicci; Andrew Noonan; Vanderbilt University

10:30 AM Intermission

- 10:45 AM "Development of a Mechanical Stage Separation Mechanism for Two-Stage Sounding Rockets"; Griffin Jourda; Nishant Sood; Georgia Institute of Technology
- 11:15 AM "Designing and Manufacturing University of South Carolina's First CubeSat Prototype"; Shruti Jadhav; Patrick Bailey; University of South Carolina
- 11:45 AM "Effects of Ground Clearance and Gurney Flap Mounting Angle on Downforce-to-Drag Coefficient Ratio"; Sreeramana Vellanki; Anirudh Sriram; University of Central Florida
- 12:15 PM "Numerical Investigation of Flow Features in Turbulent Channel Flow under Stratified and Neutral Conditions"; Steven Thompson; University of Tennessee at Chattanooga



12:45 PM—2:00 PM Luncheon
Location: Conference Center
Speaker: Bill "Roto" Reuter, President
R-Squared Solutions, LLC

Open Topic/Outstanding Branch — Location: Room 1000 Exploration Station

- 2:15 PM "Conceptual Design of Lunar Rover with Autonomous Capabilities: Autonomous Lunar Investigation and Communications Explorer (A.L.I.C.E.)"; Sohini Gupta; Wheeler High School
- 2:45 PM "Reviewing Known Mitigation Methods for Space Weather's Effects on Spacecrafts"; Natalie Perez; University of Florida
- 3:15 PM "An Overview of Lunar Resources for Mining and Extraction"; Ben Varozza; Florida Institute of Technology

3:45 PM Intermission

- 4:00 PM "Applications of Bio-Inspired UAVs for Enhanced Aerial Capabilities"; Haitish Gandhi; Embry-Riddle University - Daytona Beach, FL
- 4:30 PM "Volunteer Spirit and Outreach Through AIAA"; Mason Roddy; Emma Ferber; University of Tennessee *
- 4:45 PM "GT AIAA: Year in Review"; Ashish Cavale; Ruhani Prasad; Georgia Institute of Technology *
- 5:00 PM "Inspiring Young Aerospace Professionals— The USC AIAA Process to Educate, Engage, and Retain"; Patrick Bailey; Michael Cargill; University of South Carolina *

* Outstanding Branch Presentations (15 minute)

Teams — Location: Room 7030

- 2:15 PM "Design of a Modular Avionics System for a Two-Stage Sounding Rocket"; a team project by Georgia Institute of Technology
- 2:45 PM "Wolf Airlines: Urban Air Mobility Vehicle for Passenger and Medical Transport"; a team project by North Carolina State University
- 3:15 PM "Design and Prototype of an Autonomous UAV"; a team project by University of South Carolina

3:45 PM Intermission

- 4:00 PM "The Use of Boron Potassium Nitrate (BKNO3) in Recovery Deployment Systems for High Altitude Sounding Rockets"; a team project by Georgia Institute of Technology
- 4:30 PM "The Design and Simulation of a High-Powered Rocket Airbrake System"; a team project by Mississippi State University
- 5:00 PM "Computational Fluid Dynamic Simulations and Subscale Wind Tunnel Testing on Research Craft Design Optimized from Generated Requirements from Past AIAA DBF Competition Guidelines."; a team project by University of Alabama in Huntsville

Undergraduate — Location: Room 7010

8:15 AM "Experimental Study of Rotor-Sand Ground Interactions Utilizing Scaled NASA Dragonfly Model"; Darrell Nieves Lugo; Mario Vignali; University of Central Florida

8:45 AM "Crafting Resilience: Additive Manufacturing for Rover Mission Sustainability"; Victor Zaharia; Florida Institute of Technology

9:15 AM "Analysis of Flux Limiter Sensitivity and Shock Capturing Accuracy for LES of Turbulent High-Speed Flows"; Meghna Dutta; Julia Muller; Georgia Institute of Technology

9:45 AM "Flow Field Characterization in a Liquid-Spray Swirl Combustor"; James Yu; Louisiana State University

10:15 AM Intermission

10:30 AM "Refractive index structure function coefficient calculation and classification based on radiosonde and ground-based observation."; Christopher Cicalla; Bryan Mendoza; University of Memphis

11:00 AM "Raindrop Collision Dynamics in a Vertical Wind Tunnel with Velocity Well"; Hannah Sebek; University of Tennessee

11:30 AM "Characterization of acoustic pressure waveforms in Rijke tubes with an internal heat source and variable temperature distributions"; Emma Signor; Cody Shelton; Auburn University

Session Sponsor: Leidos**Teams — Location: Room 9020 Artemis Arena**

8:15 AM "High Amplitude Moon Surface Telecommunications Inflatable Repeater"; a team project by North Carolina State University

8:45 AM "Shear Modulus Testing in Composite Sandwich Panels"; a team project by Georgia Institute of Technology

9:15 AM "Validation and Development of an Atmospheric Electroaerodynamic Propulsion System"; a team project by Mississippi State University

9:45 AM "Design of a Lab-Scale Low-Cost Shock Tube"; a team project by University of South Carolina

10:15 AM Intermission

10:30 AM "Preliminary Structural and Thermal Modeling of a Small Student-Developed Liquid Rocket Engine"; a team project by University of Alabama in Huntsville

11:00 AM "Solid Motor Flow Analysis on Jet Vanes"; a team project by Georgia Institute of Technology

11:30 AM "Solid Propellant-Based Alternative Propulsion System for Small Satellites"; a team project by Florida Institute of Technology

Session Sponsor: Teledyne Brown Engineering**9:00 AM Poster Session**

This year we had so many submissions for the conference that we simply could not accommodate everyone for the regular competition categories. In order to provide an opportunity for all students to display their hard work and achievements, we have added a poster session to this year's conference. Students in this category will have a poster on display in conference center on Friday starting at 9:00 AM. We will have judges review and score the posters and we will provide rankings at the banquet. Those that submitted papers ahead of time will also received feedback on their paper as well. We invite all attendees to stop by the conference center to view these poster displays as well.

"A Standard Process for the Design of a High-Powered Amateur Solid Rocket Motor"; Tomas Salvo; Jacob Buell; Owen Pollack; Georgia Institute of Technology

"Design of a High-Pressure Fluid System for a Bipropellant Liquid Rocket Engine"; Thomas DiZinno; Gavin Reeves; Lucian Stelk; University of Alabama in Huntsville

"Stitched Composites for use in Aerospace Structures and Protection from Ballistic Impacts"; Isaac Hoar; Garrett Tucker; James Laird; Mississippi State University

"Modeling a Lunar Surface Transportation System via SysML"; Isabelle Pinto; Isadora Bokas; Luca Zerega; Georgia Institute of Technology

"Development of a Mobile Liquid Rocket Engine Test Bed"; Jeffery Reeves; Pierre Bougrat; Christopher McCain; University of Alabama in Huntsville

"Multiphysics Analysis of Carbon Composite Structural Batteries"; Atharva Gujrathi; Georgia Institute of Technology

"Applications of Nanocomposites and Polymeric Materials in the Aerospace Industry"; Joseph Silverman; Daria Astaire; Adel Siraeva; Florida Institute of Technology

"Demonstrating a Multi-Depth Focused Laser Differential Interferometer Based on Chromatic Dispersion"; Rachel Constantin; Sophia Edwards; University of Tennessee

"Burn Rate Characterization of Red Iron Oxide Catalyst in Ammonium Perchlorate Composite Propellant"; Connor Johnson; Jaiden Patel; Georgia Institute of Technology

"Design of a Launchable Remote-Controlled Rover and Protective Aeroshell"; Matthew Loewer; Colby Weeks; Jackson Zazarro; University of South Carolina

"Test Stand Design and Static Fire Report"; Shalini Shailesh; Margaret Hwang; Sarvesh Sathish; Georgia Institute of Technology

Undergraduate — Location: Room 1000 Exploration Station

8:15 AM "Torsional Stiffness Testing and Analysis of Composite Doublewedge Rocket Fins"; Parth Garud; Robert Ajluni; Georgia Institute of Technology

8:45 AM "Integrated Autonomous Power Line Retrieval Drone: Enhancing Emergency Response with In-Flight Charging and Smart City Applications"; Karthik Kannan; North Carolina State University

9:15 AM "Implementation of Alternative Pressure Sensitive Paint for Future Ground Testing"; Meghan Smitherman; University of Tennessee

9:45 AM "Investigating the Tubercle Effect on Symmetrical and Cambered Airfoils: A Comprehensive Study Using Ansys CFD"; Alvaro Cameo Hernanz; Titus Janshon; Florida Institute of Technology

10:15 AM Intermission

10:30 AM "Analytical Constraints of Phase Doppler Particle Anemometry in Non-Traditional Environments"; Alexandra Ramotar; Georgia Institute of Technology

11:00 AM "Conceptual Design of a long-haul low-cost passenger jet"; Yug Desai; Ethan Williams; University of South Carolina

11:30 AM "Testing and Simulation of Multiview Onboard Computational Imager CubeSat"; Wali Mian; University of Georgia

Session Sponsor: CFD Research

Teams — Location: Room 7030

8:15 AM "Design of a low-cost CubeSat for earth monitoring and data transmission"; a team project by University of South Carolina

8:45 AM "The Development and Testing of a Gaseous Torch Igniter for a Student Liquid Bipropellant Rocket Engine"; a team project by University of Alabama in Huntsville

9:15 AM "Teaching Satellite Attitude Controls and Mission Operations using Satellite Attitude Lab"; a team project by Florida Institute of Technology

9:45 AM "Gru & Vector Gimbal Rocket Design and Launch Report"; a team project by Georgia Institute of Technology

10:15 AM Intermission

10:30 AM "How Drone Photography Can Help Students Find Parking"; a team project by Mississippi State University

11:00 AM "AIAA Regional Student Conference - Flexible Inflatable Spacesuit Technology (F.I.S.T.) Abstract"; a team project by North Carolina State University

11:30 AM "Team M-Town Flyers Design, Build, Fly Competition"; a team project by University of Memphis

Session Sponsor: AEM Alumni University of Alabama

Kennedy Space Center Visitor Complex

Discover the wonders of space exploration at the Kennedy Space Center Visitor Complex. Immerse yourself in captivating exhibits that bring the cosmos to life. Refuel your adventure at one of the tasty cafes while experiencing the magic of space travel.

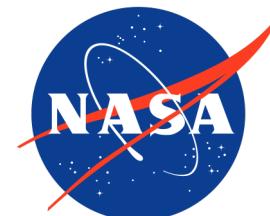


AWARDS NIGHT BANQUET
Center for Space Education
Kennedy Space Center
Conference Center



**"Launch Your Future:
The Artemis Generation's Journey with NASA"**

Guest Speaker:
Mark Wiese
Manager, Deep Space Logistics
National Aeronautics and Space Administration



Doors open at 5:30 PM
Dinner will be immediately available

Prize winners and professional attendees are invited to attend the Winners' Reception immediately following the awards banquet. Winners' Reception sponsored by **Busek**.