

AIAA Regional Student Conference 2024

Multiple dates and locations

Volume 1 of 3

ISBN: 979-8-3313-1893-2

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

The contents of this work are copyrighted and additional reproduction in whole or in part are expressly prohibited without the prior written permission of the Publisher or copyright holder. The resale of the entire proceeding as received from CURRAN is permitted.

For reprint permission, please contact AIAA's Business Manager, Technical Papers. Contact by phone at 703-264-7500; fax at 703-264-7551 or by mail at 34922 Uwptkug'Xcmg{ 'F tkxg."Uwkug"422, Reston, VA 20191, USA.

TABLE OF CONTENTS

VOLUME 1

FRESHMAN & SOPHOMORE OPEN TOPIC CATEGORY

Using Artificial Neural Networks to Calculate Lift Coefficients for an Unknown Airfoil	1
<i>Sophia Cherry, Karissa Hawk</i>	
Survey of Aerospike and Aerodisk Technologies for Drag Reduction at Hypersonic Speeds	9
<i>Laura Garzon</i>	
Arc Jet Ground Testing for Hypersonic Vehicles and Spacecraft.....	16
<i>Cole Perry</i>	
An Overview of Lunar Resources for Mining and Extraction.....	23
<i>Ben Varozza</i>	
Managing Safety Hazards in the Preliminary Design Phase of a Student-Lead Liquid Rocketry Program	29
<i>Michael Johns</i>	
Reviewing Known Mitigation Methods for Space Weather's Effects on Spacecraft.....	36
<i>Natalie Perez</i>	
Low-Cost Materials for Thermoplastic Composite Tooling	44
<i>Michael Cargill, Alberto Diaz, Wout De Backer</i>	
Autonomous Lunar Investigation and Communications Explorer (A.L.I.C.E.): Conceptual Design of Lunar Rover with Autonomous Capabilities	54
<i>Sohini Gupta, Adeel Khalid</i>	
Urban Air Mobility (UAM); Implementation & Feasibility	67
<i>Michael Hakim</i>	
Applications of Bio-Inspired UAVs for Enhanced Aerial Capabilities.....	71
<i>Haitish Gandhi</i>	
Unlocking New Horizons: The Role of Kenya's Broglio Space Center in the Commercial Space Era	79
<i>Kurt Gugelev-Shapiro</i>	

MASTERS CATEGORY

Combustion Dynamics and Thermal Characterization of a Small LOX/LCH ₄ Engine for Future Lunar Lander Applications	90
<i>Austin Morse, Pilar Gonzalez, Amzad Hossain, Ahsan Choudhuri</i>	
Variable-Density Gyroid Infill for Increased Strength and Stiffness of 3D Printed Components	101
<i>Isaac Wegner, Matthew Campbell</i>	
Active Control of Turbulent Flow Separation Over a Flapped Airfoil Using Fluidic Oscillator.....	110
<i>Ashraf Kassem, Kursat Kara</i>	

Adaptive Cruise Control for Small UAS Leader-Follower Formation Flight	121
<i>Michael Variny, Travis Moleski, Jay Wilhelm</i>	
POD and Approximate Reanalysis Based ROMs for Tow Steered Laminated Structures Considering Manufacturing Defects.....	132
<i>Soumik Dutta, Wei Zhao</i>	
Establishing a Class 3B Laser Particle Imaging Velocimetry System at the Cal Poly Water Tunnel and Verifying Results with a Class 4 Laser System.....	143
<i>Jensen Lam, Nandeesh Hiremath</i>	
A New Class of Tensile Structure: Nets with Crosslinks.....	154
<i>James Cheh, Wei Zhao</i>	
Organizational Culture and Leadership: Prerequisites to Loss Prevention in the Design, Production, Operation and Support of Complex Systems.....	163
<i>Eugene Hudson</i>	
A Priori Assessment of the Two-Level Simulation Model for Simulation of Turbulent Non- Premixed Flames	169
<i>Robert Smith, Reetesh Ranjan</i>	
Effects of Gurney Flap Setups Around Circuit of the Americas.....	180
<i>Sreeramana Vellanki, Anirudh Sriram, Michael Kinzel</i>	
Numerical Investigation of Flow Features in Turbulent Channel Flow Under Stratified and Neutral Conditions	190
<i>Steven Thompson, Reetesh Ranjan</i>	
AI/Machine Learning: Exploring IBM Watson Platform for Applications in Aerospace Industry.....	200
<i>Venkat Prasanna Kumar, Advika Arya, Sohail Zaidi</i>	
Toward the Strength of the Future: An Experimental and Computational Study of Kevlar-Epoxy Composite Laminates	208
<i>Samin Yaser Ahmed, Soumik Dutta, Wei Zhao</i>	
Safe UAV Navigation Through Wind-Aware Trajectory Planning	219
<i>Mehnaz Sharna, Shafi Al Salman Romeo</i>	
Designing and Manufacturing University of South Carolina's First CubeSat Prototype	230
<i>Shruti Jadhav, Patrick Bailey</i>	
Optimizing Robotic Arm Capture of Tumbling Satellites with a Genetic Fuzzy System Approach	241
<i>Sathyia Karthikeyan, Donghoon Kim</i>	
Development of a Mechanical Stage Separation Mechanism for Two-Stage Sounding Rockets	252
<i>Griffin Jourda, Nishant Sood</i>	
Liquid Coolant Jet Breakup with Application to Grinding	260
<i>Sheikh Ahmad Sakib, Alex Povitsky</i>	
Space Logistics Supply Chain for Interplanetary Missions.....	271
<i>Marco Salmaso, Mark Jernigan</i>	
Lunar Tourism Research Mission.....	282
<i>Jamie Andrews</i>	

Space Debris Removal: Regulatory and Ethical Challenges of a Theoretical Space Mission	293
<i>Leonor Merino Osornio, Mostafa Hassanalian</i>	
Feasibility for a Solar Powered Autonomous Drone Vertiport System.....	303
<i>Fahad Mannan, Mostafa Hassanalian</i>	
Optimum Altitude of Quadrotor in Underground Mining Autonomous Navigation	312
<i>Lukman Alabede, Mostafa Hassanalian</i>	
Development of a Small-Scale, Modular Kerosene-Nitrous Oxide Liquid Rocket Ground Test Rig.....	323
<i>Cade Christison</i>	
Development of Aluminum-Infused Thermoplastic, Additive Manufactured Hybrid Rocket Fuel Grains	334
<i>Joshua Miller, Trey Dorrell, Kurt Rouser</i>	
Machine Learning Applications for Compression Strength After Low Velocity Impacted Carbon Fiber Composites.....	345
<i>Jason Mack, Kwek-Tze Tan</i>	
An Investigation of Correlation Between Vortical Structures and Pressure Fluctuations on Different Reynolds Numbers	355
<i>Lamisa Musharrat, Saikishan Suryanarayanan</i>	

MASTERS CATEGORY - MASTERS BY RESEARCH

Enhancing Shock Standoff Distance and Drag While Reducing Heat Flux in Re-Entry Vehicles Through Counterflowing Jets: A Design Comparison Study.....	363
<i>Suraj Krishna, Divyansh Mohit</i>	
Mitigating Shock Wave Challenges Through Extended Bleed Technique in Mixed Compression Supersonic Air Intake	374
<i>Shiva Jogu, Karan Das</i>	
Performance Enhancement of Mixed Compression Supersonic Air Intake Through the Combined Application of Bump and Bleed Techniques	384
<i>Karan Das, Shiva Jogu</i>	

POSTER SESSION

Modeling a Lunar Surface Transportation System Via SysML	395
<i>Isabelle Pinto, Isadora Bokas, Luca Zerega</i>	
Design of a High-Pressure Fluid System for a Bipropellant Liquid Rocket Engine.....	406
<i>Thomas Dizinno, Gavin Reeves, Lucian Stelk, Christopher McCain</i>	
A Standard Process for the Design of a High-Powered Amateur Solid Rocket Motor.....	413
<i>Tomas Salvo, Jacob Buell, Owen Pollack, Andrew Shi</i>	
Development of a Mobile Liquid Rocket Engine Test Bed.....	424
<i>Jeffery Reeves, Pierre Bougrat, Christopher McCain, Hunter Sexton, Thomas Dizinno, Lucian Stelk, Michael Johns</i>	

Demonstrating a Multi-Depth Focused Laser Differential Interferometer Based on Chromatic Dispersion.....	435
<i>Rachel Constantin, Sophia Edwards, Mark Gragston</i>	
Applications of Nanocomposites and Polymeric Materials in the Aerospace Industry	443
<i>Joseph Silverman, Daria Astaire, Adel Siraeva</i>	
Multiphysics Analysis of Carbon Composite Structural Batteries.....	451
<i>Atharva Gujrathi</i>	
Design of a Launchable Remote-Controlled Rover and Protective Aeroshell.....	462
<i>Matthew Loewer, Colby Weeks, Jackson Zazarro, Lake Williams, Wout De Backer</i>	
Static Fire Test Stand for Jet Vanes Analysis.....	471
<i>Shalini Shailesh, Margaret Hwang, Sarvesh Sathish, James Barritt Chambers, Taekyung Kim, Pritham Sathish, Ilan Villard</i>	

TEAM CATEGORY

Embracing Next-Level Modularity: Joint Service Academy CubeSat Development at West Point	480
<i>Andrew Nguyen, Arthur Stein, Angel Pena, Catherine McClellan, Connor Rainey, Olivia Peters, Heainz Manoj, Joshua Morehead, Robert Perez</i>	
Fixed-Wing Fire Surveillance Unmanned Aircraft System and Wildfire Trajectory Software.....	491
<i>Riannon Regan, Sofia Silva, Huston Scharnagl, Matthew Fancey, Allan Acevedo, Nha D Alvarado, Sam Caldwell, Jose Jr. Betancourt Huizar, Sarah Hussain, Majd Alhakim, Trent Polizzi</i>	
Self-Launch Sailplane Utilizing Electric Driven Propulsion.....	502
<i>Amanda Kohne, Isabel Korzilius, Spencer Cochran, Sophia Collins</i>	
Automated Starlight Tracking Mechanism Shifted by SMA Springs	512
<i>Troy Yarter, Samuel Skarin, Elijah Feliciano, Emanuel Herrera Pineda</i>	
High Amplitude Moon Surface Telecommunication Inflatable Repeater.....	523
<i>Kathryn Soderman, Kathryn Soderman, Brennan Donovan, James Fernandez, Vennela Gottiparthy, Sam Masten, Jason Solomon, Nate Vandermark</i>	
Exploring Operability and Design Characteristics of a Small-Scale Methane/Oxygen Jet-In-Crossflow Rotating Detonation Engine	534
<i>Aref Abdala, Kathryn Daniel, Gabriel Shamam, Daniel Shamam, Dominic Diatzkis, Celeste Ozimek-Newman, Emil Alunno, Erik Solberg</i>	
Design and Testing of an Amphibious AUV	543
<i>Graham Driscoll-Carignan, Matthew McMahon, Spencer Granlund, Evan Russell, Ryan Chesanek, Ben Twombly</i>	
Update on the Student Development of a Liquid Bipropellant Rocket Engine	550
<i>Elias Perez, Michael Johns, Jeffery Reeves</i>	
Electrically-Actuated Jumping Exoskeleton for Lunar Locomotion	557
<i>Kaitlyn Kumar, Manas Shah, Yvonne Li, Nicolas Gomez</i>	
Design and Aerodynamic Performance of a Morphing Aileron	568
<i>Christina Azzi, Anushka Tahiliani, Sarah Nguyen</i>	

Design of an Ultra-High Bypass Turbofan Engine for a Wide-Body Commercial Aircraft	578
<i>Tazmar Dawkins, Charles Gannon, Cadence Ruiz, Christopher Imholte, Prabhakar Venkateswaran</i>	
OpenUAS: An Open-Source Unmanned Aircraft Systems (UAS) Testbed Solution Under Cost Constraints.....	588
<i>Allison Howard, Varad Kulkarni, Sydney Turner, Eric Rasmussen, Karanvir Singh, Nisha Raj, Mukul Kulkarni, Mehmet Sefer, Kristin-Yvonne Rozier</i>	
Applying Pose Estimation Techniques to Visualize Drone Trajectory in GPS-Denied Environments.....	599
<i>Ryan Mok, Evan Sayer, Dao Ton Nu, Adam Nokes</i>	
Project Albatross: Medevac UAV eVTOL Emergency Response Modular Aircraft.....	610
<i>Yahya Ismail, Adonis Aldana, Muhammed Shah, Matvey Zubkov</i>	
Large Area Solar Array for Cube Satellites	621
<i>Tyler Yuen, Sebastian Colussi, Yahya Ismail, Alex Watson, Aman Rajvegesna, Shrihari Arunachalam, Martin Feng, Navdeep Singh, Dev Dhruv, Maria Chierichetti</i>	
Designing and Testing a Test Stand to Evaluate the Performance of a Custom-Built Drone	629
<i>Gorkem Guclu, Hieu Tran, Eric Nguyen, Manroop Singh, Sohail Zaidi</i>	
VALOR: Venus Atmospheric and Geological Observation Rover	638
<i>Alberto Meunier, Sebastian Colussi, Rylan Wong, Ishan Vedagiri, Marcus Gonsalves, Svitlana Kuklenko, Charlie Morrow, Maya Campos, Mushfiq Mostafa</i>	
Active Suspension Utilizing Shape Memory Alloys for Lunar and Martian Vehicle Explorers.....	643
<i>Nicholas Casey, Misha Kuznetsov, Peyton Erickson, Eleni Xanthopoulou</i>	
Avian-Inspired Gapped Trailing Edge Wing for Energy-Efficient Roll Control	654
<i>Ashley Kwong, Swen Severson, Porter Landefeld, Joy Bergstrom, Mathew Gilpin</i>	
Design and Analysis of a SmallSat as a Communications Relay for Venus Atmospheric Probes	663
<i>Jacob Ewen, Adam Osgood, Gregoire Brougher, George Love, Issac Garry, William Baxter, Ye Lu</i>	
Teaching Satellite Attitude Controls and Mission Operations Using Satellite Attitude Lab.....	674
<i>Shannon Tracy</i>	
Autonomous, Nitinol-Actuated, Three-Way Splitter Valve for Spacecraft Thermal Management Systems.....	685
<i>Scarlett Hao, Ivan Moreno, Daniel Gonzalez, Kurt Magsumbol, Akshay Potnuru</i>	
Design of a Maneuverable Autonomous Aerial Vehicle Enabling Research in Intelligent Controls (Project MAAV-ERIC)	693
<i>Connor Fadden, Jacob Stukas, Joshua Nguyen, Xavier Torres Arpi, Srikanth Gururajan</i>	
Magnetic Field Mapper Using Commercial off the Shelf (COTS) Components.....	704
<i>Yubo Fu, Filippo Di Benedetto, Andrew Orr, Devin Kelsey, Ezra Keto, Alvaro Romero-Calvo</i>	
Design of a Stability System to Secure a Mobile Liquid Rocket Test Stand	712
<i>Hunter Sexton, Gavin Reeves, Christopher McCain, Lucian Stelk</i>	
Wolf Airlines: Urban Air Mobility Vehicle for Passenger and Medical Transportation	718
<i>Emily Hayman, Alex Elchik, Nathan Baker, Rishi Ghosh, Ajay Pandya, Aaron Hart, Maya Keele</i>	

Stability Characterization of the Orion Parachute System During Final Re-Entry Phase	729
<i>Taylor Edwards, Aaron Loya, Isaiah Stickley, Thomas Yechout</i>	
Analyzing the Potential of Space Elevator Technology for Sustainable Asteroid Mining.....	740
<i>Joseph Bate, Noor Yousuf, Josiah Rothwell, Lynanne George</i>	
NASA TSGC Lunar Personal Electric Vehicle Mechanical Design	751
<i>Jayce Thedford, Griffin Darosa, William Bradshaw, Ugochukwu Etufugh, Akash Musale, Christian Millard, Nourouddin Sharifi</i>	
A Low-Cost, Multifunctional Environmental Remote Sensing Sensor Using GNSS Interferometric Reflectometry	762
<i>Rebecca Blum, Max Feinland, Claire Wadman, Jillian Pace, Khosro Ghobadi-Far</i>	

VOLUME 2

Demonstration of a Low-Cost, Highly-Proliferated Remote ID Drone Detection Network.....	773
<i>Ian Faber, Anna Sophia Rorrer Warren, Jonathan Abrams, Matthew Januszewski, Muhamnad Ibrahim, Reid Godbey, Ryan Caputo, Colton Brown, Sean Peters</i>	
CubeSat Test Platform for an Ultra-Lightweight Carbon Fiber Radiation System for High Performance Nuclear Electric Power and Propulsion Systems	784
<i>Nathaniel Polus, Liam Piper, Benjamin Peters, Paige Rust, Zachary Taillefer</i>	
The Design of a Suborbital Model Rocket Capable of Payload Delivery	795
<i>Madison Burlett, Ethan Century, Austin Shealy, Mario Villegas</i>	
Experimental Validation of a Novel Wind Turbine Blade Power Optimization Methodology for Skewed Fluid Flow.....	803
<i>Emelia Clark, Matthew Simpson, Trevor Joncich, Saurabh Agrawal, Andre Mazzoleni</i>	
Calcium Sulfate Crystal Growth in Microgravity.....	814
<i>Luke Davis, Blake Macdonald, Noah Grebe, McKenna Lovejoy</i>	
Design and Prototype of an Autonomous UAV	821
<i>Yug Desai, Jordan Ali, Christopher Rhoades, Andrew Ayers, Mohamad Madani, Wout De Backer</i>	
Ablative Pulsed Plasma Thruster: Understanding Ablation Processes and Plasma Restrikes by Minimizing Current Backflow.....	832
<i>Thuy Pham, Henry Adam, Brendyn Byrne, Sami Haq, Robert Antypas</i>	
Flexible Inflatable Spacesuit Technology (FIST).....	843
<i>Matthew Yacovone, Carolina Adri Lima, Faris Moghrabi, Isabelle Seeman, Jonathon Furman, Tristen Davis, Abhyuday Gandikota</i>	
Solid Propellant-Based Alternative Propulsion System for Small Satellites	854
<i>Jacob Mesley, Steven Holmberg, Kayley Westerfield, Kadin Caldwell</i>	
Liquid Bipropellant Rocket Design.....	865
<i>Sherie Laprade, Matthew House, Niyati Shah, Shelton Waddell, Sherie Laprade</i>	
Design and Analysis of a High-Powered Rocket Airbrake System	876
<i>Tyler Sprague, Neil Sanipara, Alex Belew</i>	

Design and Drop Test of Sounding Rocket Parachute System	887
<i>Nicholas Gaug, Morgan Gregg, Michael Pena, Harry Shrager, Vincent Nguyen, Alfonso Lagares</i>	
Validation and Development of an Atmospheric Electroaerodynamic Propulsion System	896
<i>Tyler Zeringue, Britain Steele, Gaige Sidaway, Conner Evans, Tyler Zeringue</i>	
Design of a Modular Avionics System for a Two-Stage Sounding Rocket	905
<i>Joseph Clary, Alfonso Lagares, Barnabe Marty, Griffin Jourda</i>	
The Use of Boron Potassium Nitrate (BKNO ₃) in Recovery Deployment Systems for High Altitude Sounding Rockets.....	915
<i>Michael Pena, Virginia Anne Tennant, Morgan Gregg</i>	
Design and Development of a Hybrid Rocket Engine Test Stand to Study Exhaust Flow Gas Dynamics and Chemical Kinetics.....	923
<i>Wesley Hutcherson, Russell Gaerlan, Carlos Fernandez, Shyam Menon</i>	
Shear Modulus Testing in Composite Sandwich Panels.....	932
<i>Sarah Dea, Carlotta Bresciani, Karthik Kumar, Nathaniel Murcin, Julian Raaf, Parth Garud, Robert Ajluni</i>	
Design of a Low-Cost CubeSat for Earth Monitoring and Data Transmission.....	941
<i>Robert Hudson, Christian Smith, Deanna Des Riviere, Tucker Barnes</i>	
A Computational Analysis of Jet Vanes Thrust Vector Control for Solid Rocket Propulsion.....	952
<i>Sameer Sheth, Noah Kraus, Atharva Gujrathi, Jacob Buell, Hyeonbi Jee, Josh Hammond</i>	
Gru & Vector Gimbal Rocket Design and Launch Report	963
<i>Catherine Fang, Owen Pollack, Patrick Barry, Krish Mishra, Sarvesh Sathish, James Barritt Chambers, Taekyung Kim, Cheng Liu, Albert Zheng, Ilan Villard, Alexander Swift</i>	
Optimizing Thrust Reversal for a Small Turbojet Engine	973
<i>Andrew Dornack, Robert Zajec, Tanner Sabau, Stephanie Anokye, Kevin Hong, Nolan Little, John-Paul Boulos, Randall Mathison</i>	
M.A.H.S. (Monitoring of Airframe Health Systems)	983
<i>Elizabeth Breckenridge, Benjamin Renninger, Robert Paquette, Patrick Browning</i>	
Roll Reduction System for Mid-Power Rocket	994
<i>Samuel Olsavsky, Paislee Adlington, Nathan Bonafield, Patrick Browning</i>	
Design of Thermally Efficient Cryogenic Tanks for Spacecraft.....	1005
<i>Quentin Collins, Rayden Farrington, Roman Gowie, Alice Kelly, Sean Nuzio, Nathaniel Polus, Janelly Torres, Jagannath Jayachandran</i>	
Development of a Generalized Controls System Interface for Liquid Rocket Engine Testing.....	1016
<i>Aaron Hoffman, Jackson Frame, Christina Griggy, Joshua Panchana</i>	
Sustainable Aviation Fuel's Effect on Buna-N O-Rings.....	1024
<i>Peter Rassam, Dalton Grantham, Riley Benefiel, Rob Niehaus, Chloe Gaylor, Isabella Panek, Todd Lowe</i>	

Novel Manufacturing Methods of Ammonium Perchlorate Composite Propellant Motors at the United States Military Academy.....	1032
<i>Pavel Shilenko, Megan Cobb, Pierce Bazewics, Young Chen, Killian Noone, Charles McNeill, Eric Woo, Charles Price, Lukas Gacek, Stephen Simmerer, Michael Vogel, Robert Perezalemany</i>	
Project RADARS Rocket Altitude Determination and Response System.....	1043
<i>Matthew Muetzel, Tim Drake, Mary Otten, Colin Cummins, Sanjay Jayaram</i>	
Enhancing Altitude Control in Aerospace Systems	1053
<i>Jackson Perrine, Alyssa Pina, Brian Davis, Daniel Bluedorn, Josh Berkman, Kaiden Kiracofe, Kelsey Sanchez, Jared Pulliam, Juancarlos Munoz, Veronica Fujihara</i>	
Performance Comparison of PID and Reinforcement Learning Architectures in Non-Cooperative Relative Spacecraft Formations.....	1064
<i>Jacob Witthuhn, Ryan Karow, Bryson Waugh, Imraan Faruque</i>	
Noise-Free Relative Attitude Determination System for Payload Extended from Satellite Body	1075
<i>Tanner Brummond, Aidan Luczkow, Bob Marshall</i>	
We Were Freshmen – How We Participated in Academic Research in Aerospace Engineering at Saint Louis University, and What We Learned from that Experience!	1086
<i>Scott Goebel, Ryan Gade, Pannav Mittal, Srikanth Gururajan</i>	
Design & Fabrication of JetCAT P100-RX Thrust Reverser Modification	1093
<i>Charles Daggett, Luis Kastner, Alexandra Boyko, Ryan Evans, Blake Brown, Kade Faith, Kurt Rouser</i>	
Self-Circulating Hydrodynamic Bearing Test Rig.....	1104
<i>Hannah Liggett, Brandon Allen, Josh Beranek, Jonathan Lemmon</i>	
The Preliminary Structural and Thermal Modeling of a Small Student-Developed Liquid Rocket Engine.....	1115
<i>Austin Morse, Zachary Moore, Christa Cartwright, Steven Jones, Phineaus Masters, Jacob Williams</i>	
Development of a Gaseous Oxygen-Gaseous Propane Torch Igniter for a Sub-Scale Bipropellant Liquid Rocket Engine.....	1126
<i>Zachary Moore, Austin Morse, Luke Fritz, Amanda Matzek, Owen Newson, Vraj Patel, Luke Raque</i>	
Thermal Modeling and Simulation of a Pico-Satellite in Low Earth Orbit	1135
<i>Trout Marnell, Emily Hagen, Patrick Blanchard, Rawsen Mitchell, Serdar Tumkor</i>	
Experimental Study of the Effect of Different Winglet Configurations on the Lift and Drag Characteristics of Blended Wing Body Aircraft	1142
<i>Shah Ishrak, Md. Adnan Nur Bhuiyan Shuvo, Faria Tasnim</i>	
Space Debris Mitigation Using Trajectory Director Spacecraft with Onboard Electrospray Thrusters	1152
<i>Ria Dey, Bhavya Saxena, Remu Subba, Karma Yangdon</i>	
Investigating Shock Wave Boundary Layer Interaction with Repeated Backward Steps.....	1159
<i>Adithya Vijay, Pranay Agrawal, Lisa Francis Dsouza, Anurag Kumar Jha, Naveen Katkam, Ullas Aj</i>	

Unlocking Hypersonic Potential: Advancements in Dual Combustion Ramjet Engine Technology for Superior High-Speed Propulsion	1169
<i>Daksha Tuteja, Shivansh Rana, Vedika Garg, Tanishka Verma, Loukik Deshpande, Swaraj Patil, Astha Rai</i>	
Construction of a Small Fixed Wing UAV for Surveillance	1178
<i>Asif Hasnayeen, Md Redwan Iqbal, Farhan Syeed, Morsalin Sheikh</i>	
Studies on Cavitation, Multi-Phase Sanal Flow Choking, and Bubbly Flows Causing Shock Waves in Liquid Rockets	1189
<i>Raunak Sharma, Anmish Varma, Debayan Roy, Yaman Vohra, Jasnoor Singh Oberoi, Meraj Alam, Sameeha Khan, Arun Janakiraman, Shivansh Rana</i>	
Developing a Hybrid Composite with Natural and Synthetic Fibers to Enhance Mechanical Properties and Performance.....	1200
<i>Bhavey Khanna, Harman Singh, Anurag Singh</i>	
Numerical Analysis of Pintle Nozzle Geometry Optimization for Improved Thrust in Rocket Engines	1207
<i>Lisa Dsouza, Adithya Vijay, Ullas Aj, Anurag Kumar Jha, Pranay Agrawal, Naveen Katkam</i>	
Back Propagation of Acoustic Waves Through the Boundary Layer of a Choked Nozzle Creates Combustion Instability During Secondary Injection Thrust Vector Control.....	1217
<i>Vedika Garg, Loukik Deshpande, Swaraj Patil, Tanishka Verma, Shivansh Rana, Daksha Tuteja, Maansi Srivastava, Tanisha Singh</i>	
Human Spaceflight: Caution in Using Archimedes' Principle for Microgravity Experiments in Dynamic Conditions.....	1227
<i>Tanishka Verma, Swaraj Patil, Loukik Deshpande, Vedika Garg, Shivansh Rana, Daksha Tuteja, Yaman Vohra</i>	

UNDERGRADUATE CATEGORY

Outlining Digital Cognitive Assistants for Demanding Space Missions: Navigating Human-System Teamwork in Astronaut Operations	1234
<i>Paige Rust, Liam Piper</i>	
Using Inductive and Microwave Power Transfer to Design a Wildfire Tracking Drone	1243
<i>Jeremy La Porte</i>	
Hamiltonian Adaptive Variational Integrators for Nonconservative Problems in Astrodynamics.....	1251
<i>Yihong Zhu, Harsh Sharma</i>	
Quick Link: A NAR Level 2 Certification Rocket	1261
<i>Nathan Tardy</i>	
Characterization of an Adamantane Thruster by a Langmuir Probe.....	1272
<i>Cameron Coen, Autumn Zaretsky, Matthew Gilpin</i>	
Investigating the Tubercle Effect on the NACA 24xx Airfoil Series: Investigation Using Ansys Fluent.....	1282
<i>Alvaro Cameo Hernanz, Titus Janshon</i>	
Performance Optimization for Nylon 12 Additive Manufacturing Materials in Near Space Applications.....	1293
<i>Yimang Tang, Mary Bowden</i>	

Design and Fabrication of a Customizable Multi-Axis Load Cell with Commercial Off-The-Shelf Components.....	1304
<i>Pyeongkang Kim, Nandeesh Hiremath</i>	
Development of a Modular Open Jet Wind Wall for Generating Dynamic Wind Profiles	1315
<i>Geourg Kivijian, Nandeesh Hiremath</i>	
Efficient Particle Collision Detection Via Tetrahedron Tangent Sphere Criterion.....	1323
<i>Aastha Bagree</i>	
Experimental Analysis of the Impact of a Compressed Air Wind Tunnel Facility on a Rotorcraft Wake.....	1334
<i>Jayden Slotnick, Mark Miller</i>	
Crafting Resilience: Additive Manufacturing for Rover Mission Sustainability	1345
<i>Victor Zaharia</i>	
Active Control and Guidance-Aided Propulsive Landing Research for Small-Scale Vehicles	1353
<i>Cheng Liu</i>	
Hitting a Moving Target: Autonomous Path Planning Methods for an Evolving Environment	1363
<i>Jordan Kreh</i>	
The Evaluation of Various Controller Architectures for an Air Brake on a High-Powered Model Rocket.....	1374
<i>Sophie Jack</i>	
Comparison of CFD Visualization Methods for Separated Flows.....	1385
<i>Andrew Mahler, Godfrey Mungal</i>	
EXPERIMENTAL INVESTIGATION OF THE BELL X-1'S VERTICAL STABILIZER USING HEATED FLOWS TO REPLICATE SUPERSONIC FLIGHT CONDITIONS IN A SUBSONIC WIND TUNNEL	1396
<i>Annemarie Bernardi, Craig Merrett</i>	
High Reynolds Number Wind Turbine Testing in the Compressed Air Wind Tunnel	1407
<i>Kyle Devlin, Mark Miller</i>	
Using the Drag Equation and Euler's Method in Python to Predict Model Rocket Flight Trajectories	1418
<i>Kulvir Jaydeep Chavda</i>	
Implementation of Rotating Test Stand for Supersonic Wind Tunnel	1429
<i>Suren Sanai, Nandeesh Hiremath</i>	
Accurate State Uncertainty Propagation for a Spacecraft in the Cislunar Regime	1440
<i>Andrew Glenn, Puneet Singla</i>	
Statistical Surface Heat Flux Analysis in Simulated Solid Rocket Propellants Flames.....	1451
<i>Jacob Rodriguez, Joseph Kalman</i>	
Creating Velocity Wells in a Vertical Wind Tunnel	1459
<i>Emma Ferber</i>	
Porosity Measurements on Quenched Solid Ramjet Fuels	1467
<i>Jack Karapetian, Joseph Kalman</i>	

Laser Profilometry and Characterization of UV-Shielding Solgel 3D-Printed in Microgravity	1478
<i>Maddux Testa, Patrick Browning</i>	
Ram Accelerator Interstage Diaphragm Replacement Valve	1487
<i>Connor Fallot, Carl Knowlen</i>	
Venus Atmospheric Droplet Sample Collection System.....	1496
<i>Kaitlyn Dobler, Angela Sayadian</i>	
CNN-Based Optical Image Analysis for Satellite Component Detection.....	1507
<i>Joseph Murray, Roshan Eapen</i>	
Amendment to Glauert's Optimum Rotor Disk Solution.....	1518
<i>Divya Tyagi, Sven Schmitz</i>	
Fabrication of Temperature Sensitive Paint Applied to Polyvinyl-Chloride Adhesive Films for Global Surface Temperature and Heat Flux Measurements	1529
<i>Sophia Edwards, Rachel Constantin, Mark Gragston</i>	

VOLUME 3

Dynamics and Control of an Autonomous Buoyancy-Driven Underwater Robot.....	1537
<i>Joynob Kaoshar, Derek Paley</i>	
Temperature Relaxation Effects on Ethylene Combustion in a Shock Tube at Scramjet-Relevant Conditions	1548
<i>Aaron Wilfert Wilfert, Mitchell Hageman</i>	
Static Calibration of Platinum-Based Pressure Sensitive Paint	1559
<i>Neil Sawant, Christopher Combs</i>	
The Application of Phase Sensitive Detection in High-Resolution Acoustic Measurements	1570
<i>Tymur Tkachenko, Shawn Wehe</i>	
Assembly and Testing of Additively Manufactured Cold-Gas Propulsion Systems for the VIrtual Super-Resolution Optics Using Reconfigurable Swarms (VISORS) Mission.....	1580
<i>Ethan Traub, Althea Noonan</i>	
Liquid Particle Tracking in Quiescent Flow for Application in High-Speed Flows	1589
<i>Adin Goldberg, Hassan Ifti</i>	
Design, Analysis, and Testing of a Quadrotor Interceptor and Deep Reinforcement Learning Based Counter-UAS System	1599
<i>Ben Falco, Michael Otte</i>	
Forward and Inverse Dynamics Solutions of a 3D Rigid Body in Pure Rotation.....	1609
<i>Florian Grader-Beck, Richard Ren, Olivier Bauchau</i>	
The Application of Geometric and Clifford Algebras in Multibody Kinematic Systems	1618
<i>Congheng Ren, Florian Grader-Beck, Olivier Bauchau</i>	
Numerical Analysis of Transitional Hypersonic Flow Over Cone/Flare Geometries.....	1629
<i>William Cook</i>	

Investigating Additively Manufactured Hybrid Rocket Motor Performance with Aluminum-Infused Thermoplastic Filaments	1636
<i>Trey Dorrell, Alex Earnhart, Kurt Rouser</i>	
Space Debris Mitigation: Integration of Carbon Nanotube Cold Cathode Electron Emission with Electrodynamic Tether Payload for Rapid Deorbiting of Nanosatellites	1645
<i>Lovejivan Sidhu, George Zhu</i>	
Analysis of Flux Limiter Sensitivity and Shock Capturing Accuracy for LES of Turbulent High-Speed Flows	1655
<i>Meghna Dutta, Julia Muller, Joseph Oefelein</i>	
Modelling, Analysis and Experimental Evaluation of Inline Swimming with a Soft Robotic Fish.....	1665
<i>Kruti Bhingradiya, Derek Paley</i>	
Torsional Stiffness Testing and Analysis of Composite Doublewedge Rocket Fins.....	1674
<i>Parth Garud, Robert Ajluni</i>	
Investigating the Effects of the Magnetic Field on Non-Magnetic Ions in Helicon Thrusters	1685
<i>Lars Knudsen</i>	
Uncertainty Quantification of Operating Conditions on the Structure of Turbulent Premixed Flames Using Non-Intrusive Surrogate Modeling Strategy	1691
<i>David Brown, Reetesh Ranjan</i>	
Parametric Investigation of a Bio-Inspired Gust Mitigation.....	1700
<i>Jareth Tosses, Samuel Stanton</i>	
The Effects of Diffuser Throat Design for a Supersonic Indraft Wind Tunnel	1708
<i>John Hilker, Sidharth Gs</i>	
A Validation of FlightStream for Store-Separation Modeling	1719
<i>Matthew Campbell</i>	
Flow Field Characterization in a Liquid-Spray Swirl Combustor	1729
<i>James Yu, Shyam Menon</i>	
Analytical Constraints of Phase Doppler Particle Anemometry in Non-Traditional Environments	1739
<i>Alexandra Ramotar, Adam Steinberg</i>	
Dynamics of an Aircraft with Varying Mass and Inertial Properties	1750
<i>Luca Valenti, Samuel Stanton</i>	
Asymmetric Vortex Breakdown on Generic Fighter Aircraft at High Angle of Attack	1760
<i>Nolan Brody, Casey Fagley</i>	
Raindrop Collision Dynamics in a Vertical Wind Tunnel with Velocity Well	1771
<i>Hannah Sebek</i>	
A Parallel Approach to Arbitrarily-High Antenna Pattern Visualizations.....	1780
<i>Brady Phelps, Chad Mourning</i>	
Implementation of Alternative Pressure-Sensitive Paint for Future Ground Testing.....	1787
<i>Meghan Smitherman</i>	
Ignition Delay Times of Undiluted Ethylene and Air at Scramjet Relevant Conditions.....	1796
<i>Jared Staib, Michael Knadler</i>	

Innovative Hydrogen Harvesting System.....	1804
<i>Junhyeong Ahn</i>	
Machine-Learning-Based Wind Detection and Avoidance Using a Crazyflie Micro Drone	1811
<i>Kyle Vanhorn, Artur Wolek</i>	
Investigation of the Truss-Braced Wing Concept for sUAS-Sized Aircraft	1822
<i>Christian Ghiugan</i>	
Ethics in Human Spacecraft Design: The Role of Artificial Gravity in Mitigating Microgravity Effects.....	1831
<i>Evan Martin, Lynnane George</i>	
Preliminary Investigation of a High-Speed Formation Flight Concept	1837
<i>Joseph Oczkewicz, Samuel Stanton</i>	
Calibrating Fast Responsive Temperature-Sensitive Paint from 0 to 100 Degrees Celsius.....	1845
<i>Andrew Cervantes, Christopher Combs</i>	
Experimental Study of Rotor-Sand Ground Interactions Utilizing Scaled NASA Dragonfly Model	1851
<i>Darrell Nieves Lugo, Mario Vignali, Michael Kinzel</i>	
Refractive Index Structure Function Coefficient Calculation and Classification Based on Radiosonde and Ground-Based Observation.....	1862
<i>Christopher Cicalla, Bryan Mendoza</i>	
Design and In-House Manufacturing Dynamics of a Modular RDE at NCSU	1870
<i>Kierra Shook, Ben Delgado</i>	
Multi-Functional Autonomous Power Line Retrieval Drone with In-Flight Charging for Enhanced Emergency Response and Smart City Applications.....	1881
<i>Karthik Kannan</i>	
Conceptual Design of a Long-Haul Low-Cost Passenger Jet.....	1892
<i>Yug Desai, Ethan Williams</i>	
Development of a Low Cost and Low Weight Small UAS Flight Test Instrumentation System.....	1903
<i>Tomas White, Alejandro Fonnegra, Omar Hazbon</i>	
Adaptive Locomotion for Planetary Exploration Robots	1914
<i>Ian Long, Cagri Kilic</i>	
Experimental Investigation of Radial Impeller Design for Electric Pneumatic Propulsion.....	1924
<i>Luke Sadowski</i>	
Automated Dimensional Analysis Through MATLAB®	1933
<i>Noah Parsons, Wade Huebsch</i>	
Research into the Development and Testing of Microgravity Test Beds	1939
<i>Henry Coyle, Caren Wisa, Patrick Browning</i>	
The Aerodynamic Optimization of a Multi-Element Wing for a Formula SAE Car	1949
<i>Andrew Ratterman, Ryan Paul</i>	
Technical Recreation and Interfacing of a NASA ISS EXPRESS Rack Locker for Use in Microgravity Research	1960
<i>Travis Allen, Renee Garneau</i>	

A Historical Perspective on Old Dominion's Aerospace Research Partnership with NASA Langley Research Center.....	1967
<i>David Morgan</i>	
Project the Belly: Long Range, Short Field, Unmanned Cargo Plane Design.....	1976
<i>Robert Immekus</i>	
Development of a Kalman Filter for Attitude Determination and Control of a Satellite Mission	1987
<i>Amber Diaz</i>	
Ambient Temperature Strength Degradation of a Ceramic Matrix Composite Due to Solid Particle Erosion	1995
<i>Jonathan Clawson, Gregory Morscher</i>	
Design of Aerospike Nozzles for Rotating Detonation Engines Using Computational Fluid Dynamics and Machine Learning Techniques.....	2005
<i>Philip Wilson, Khushi Piparava, Liwei Zhang</i>	
Liquid Rocket Test Stand Performance Sensitivity to Kerosene-Nitrous Oxide Flow Rates	2013
<i>Mason Biliske, Dev Patel</i>	
Comparison of Analytical and Experimental Propeller Performance for Small Unmanned Aircraft Applications.....	2024
<i>Noah Greeson, Dawson Manning, Dr. Kurt Rouser</i>	
Predicting Low Velocity Impact Damage of Laminated Composites Using Artificial Neural Network Machine Learning Models.....	2034
<i>Andrew Kovac, Kwek Tan</i>	
Analysis of the Wake and Streakline Behavior of Bluff Bodies	2042
<i>Kenzie Brant</i>	
Wind Tunnel Evaluation of Control Effectiveness of an F-16 with a Bio-Inspired Rotating Empennage	2053
<i>Evan Komschlies, Casey Fagley</i>	
Curved Fiber Patterns in 3D-Printed Carbon Fiber Composites: A Flexural Study.....	2064
<i>Isaac Sluder, Peyton Curtis, Kwek Tze Tan</i>	
Characterizing the IZOD Impact Strength of a 3D Printed Reinforced Carbon Fiber Composite Material with Varying Layup Orientations	2071
<i>Andrew Frankowski, Isaac Sluder, Kwek Tze Tan</i>	
3D Printed Carbon Fiber Reinforced Polymeric Composites in Tension	2079
<i>Peyton Curtis, Andrew Frankowski, Kwek Tze Tan</i>	
Design of an Experimental Solid Rocket Motor Using Angry Listerine Propellant.....	2085
<i>Andrew Fuller, Johnathan Bettes, Manigandan Kannan</i>	
The Design and Validation Process of a Coaxial Swirl Injector Plate for Bipropellant Liquid Rocket.....	2096
<i>Hao Yu, Harrison Pasquinilli, John Horack</i>	
Extracting Information from NOTAMs Using Named-Entity Recognition.....	2105
<i>Owen Salyer, Chad Mourning</i>	

Enhancing Aerodynamic Performance of the NERL S814 Aerofoil for Horizontal Axis Wind Turbines Using Curved Slot Configurations	2110
<i>Ritesh Mane, Harshita Singh</i>	
Using Julia for an Effective Direct Numerical Simulation of Turbulent Flow Over Streamwise and Spanwise Roughness Elements	2119
<i>Quynh-Anh Duong</i>	
Regression Rate Study of Polyurethane in a Lab-Scale Hybrid Rocket Motor	2130
<i>Szu Heng Chen, Syeda Mahmuda</i>	
Experimental Investigation on Electrohydrodynamic Thrust Generation System Utilizing Converging Nozzle and Ionic Wind.	2139
<i>Jeevansh Yadav</i>	
Hourly Scale Model of Wind Speed and Direction Based on Stochastic Differential Equations	2146
<i>Maayan Shimoni</i>	
Effect of Linear and Nonlinear Mechanisms on Flow Structures in Couette Flow	2157
<i>Ofek Frank-Sapir</i>	
Image-Based Machine Learning to Inform the Simulation of Damage in Fiber Reinforced Composites	2168
<i>Robert Graham</i>	
Experimental Characterization of the Noise Emissions by Wind Turbine Blades with a Serrated Leading Edge.....	2176
<i>Siu Ting Yeung</i>	
Using Scientific Machine Learning to Enhance Measurements of 2D Turbulent Flows with mODIL	2186
<i>Christopher Scott</i>	
Parametric Study of Endplate Winglets.....	2194
<i>Harshi Bavishi</i>	
Optimization of Supersonic Multi-Row Disk Inlet Devices: Analyzing Shock Structures and Performance with Various Semi-Cone Angles and Microcavity Integration	2204
<i>Yaman Vohra</i>	
Experimental Characterization of the Aeroacoustics of a Box-Like Spiroid Winglet	2212
<i>Subin Kim</i>	
Examining Internal Ballistics and Acoustic Power Levels in SRMs: Impact of Port Geometry and Launch Pad Spike Design.....	2220
<i>Shivansh Rana</i>	
Enhanced Urban Wind Energy Generation: Performance Analysis of PMSG-Integrated H-Type Darrieus Turbines with Advanced Storage Systems	2230
<i>Bhargav N, Akhila Deepak Kumar, Sakthivel Kumaravel</i>	
Jet Noise Reduction in Chevrons Nozzles from a Wavepacket Model Perspective	2241
<i>Quan Huynh</i>	
Investigating the Influence of Separate Propellant Streams in Rotating Detonation Engine Injectors.....	2252
<i>Leon Phillips</i>	

Enhancing Combustion Characteristics in Cavity-Based Scramjet Combustors Using Diamond-Shaped Dual Struts	2263
<i>Harshita Singh, Ritesh Mane</i>	
Impact of High Lift Devices on the Aerodynamic Performance of Supercritical Airfoils.....	2274
<i>Garima Kushwaha</i>	
Evaluating Trade-Offs Between Airfoil Thickness and Aerodynamic Performance in the Transonic Regime	2282
<i>Shivangi Sinha</i>	
Loads on Turbine Blades from Shockwave Reflections and Supersonic Flow	2289
<i>Thomas Finlay</i>	
Stroke Capable Air Ambulance: Detailed Design and Implementation Plan.....	2300
<i>Ashleigh Jahne, William Thomas</i>	
Automated Real-Time Detection & Tracking of Airspace Objects Using a Pan-Tilt-Zoom Camera	2311
<i>Ming Lui</i>	

Author Index