29TH ANNUAL
FELLOWSHIP SYMPOSIUM
UTAH NASA SPACE GRANT CONSORTIUM
8 MAY 2023
held at
WEBER STATE UNIVERSITY
NOORDA ENGINEERING BUILDING
1465 EDVALSON STREET ~ OGDEN, UT 84408

8:30-9:00 AM **Registration –** sign in and pick up materials

9:00 AM **Welcome and Introductions**

- **Dr. Joseph Orr, Utah Space Grant Consortium Director**
- **Dr. Brian Rague, Assoc. Dean of Engineering, Applied Science, and Technology, Weber State University**

All participants meet together at 9:00 a.m. in Forum on first floor - we will break into concurrent sessions in Rooms 304, 325, and 326 for presentations beginning at 9:15 AM

Session 1 — Session Chair: Dr. Kai Kuck, University of Utah — Noorda Bldg, Rm 304
9:15 AM – 9:55 AM

9:15 AM **Trey Blackwell** (Kai Kuck), *University of Utah*
Venturi Adapters – Feedback Control and Dynamic Modeling Simulation

9:25 AM **Nathan Welker** (Daniel Maynes), *Brigham Young University*
Aerodynamic Effects of Phase Offset Between Synchronized Propellers in Hover

9:35 AM **Collin Ynchausti** (Larry Howell), *Brigham Young University*
Preliminary Exploration of Approaches to Increase the Stability of Flat-Foldable Origami-Adapted Designs in the Open, Flat State

9:45 AM **Kyle Jackson** (Yu Huang), *Utah State University*
Development of a Nano-Encapsulation Platform with a Novel Antioxidant Indigoidine for the Mitigation of Space Radiation

Session 2 — Session Chair: Dr. Cammy Peterson, Brigham Young University — Noorda Bldg, Rm 325
9:15 AM – 9:55 AM

9:15 AM **Kaylee Tanner** (Gustavious Williams), *Brigham Young University*
Using Landsat and Sentinel to Investigate Drivers of Algal Growth in Utah Lake

9:25 AM **Mark McDonald** (Cammy Petersen), *Brigham Young University*
Steering Colloids Using Chemical Gradients and Model Predictive Control

9:35 AM **Alex Chanson** (Maria Rodriguez), *Utah State University*
Notes of Black Holes

9:45 AM **Hunter Pruett** (Spencer Magleby), *Brigham Young University*
Magnetically-Stabilized LET Joints for Origami-Based Space Arrays

NASA Partner

Session 3 — Session Chair: Dr. John Armstrong, Weber State University — Noorda Bldg, Rm 326
9:15 – 9:55 AM

9:15 AM **Ivyann Running** (Spencer Magleby), *Brigham Young University*
Principles and Categorization of Compliant Surrogate Folds for Deployable Origami-Inspired Mechanical Systems

9:25 AM **Emilee Rickabaugh** (Elizabeth Vargis), *Utah State University*
Modeling the Effects of Space Travel on the Cardiovascular System using a Bio-Mimetic *In Vitro* Hagfish Protein Model of the Myocardium

9:35 AM **Lars Lofgren** (Kai Kuck), *University of Utah*
Advances in Noninvasive Urine Oxygen Monitoring for Detection of Acute Kidney Injury

9:45 AM **Shea Smith** (Shiuh-hua Wood Chiang), *Brigham Young University*
Ultra-low Power ADCs for Space Sensors and Instruments

POSTER SESSION *Posters presented by students and student teams with Q&A* — Noorda Bldg, 3rd Floor
10:00 AM – 10:55 AM

BRIGHAM YOUNG UNIVERSITY

Anna Cardall (Gustavious Williams), *Brigham Young University*
LASSO (L1) Regularization for the Development of Sparse Remote-Sensing Models of Water Quality

Alex Gallion (David Allred), *Brigham Young University*
Photodegradation of Self-Immolating Polymers as a Potential Solution to Optical Scattering

SALT LAKE COMMUNITY COLLEGE

Isaac Bentley (Lane Law), *Salt Lake Community College*
Using Projected Sound to Create Specified Objects

Aikhin Cheng (Lane Law), *Salt Lake Community College*
The Benefits of Bifidobacterium Longum and its Viability in Different Environments

Alix Elliston (Lane Law), *Salt Lake Community College*
Supplementation of Martian Regolith Media for Sustained Cyanobacterial Growth

Lonnie Ernst (Lane Law), *Salt Lake Community College*
Reducing Carbon Dioxide Levels on Mars Using Cyanobacteria

Kyler Ingles (Lane Law), *Salt Lake Community College*
Rover Propulsion in Frozen Environments

Davis Lewis (Lane Law), *Salt Lake Community College*
Thermally Powered Solar Panels

Paul Rodriguez (Lane Law), *Salt Lake Community College*
Production of an Auto Bioluminescent E.coli with Enhanced Lumen Emission

Antonio Ruiz-Ayala (Lane Law), *Salt Lake Community College*
Synthesis of Optically Active Chiral Compounds Using CO_2

Mia Sheneman (Lane Law), *Salt Lake Community College*
How is a Clean Environment Making Astronauts Sick?

Chandler Taylor (Andrew Vogt), *Salt Lake Community College*
Optimization of Nozzle Profiles to Achieve Higher Thrust Performance with Lowering Manufacturing Costs

Luis Valdez (Lane Law), *Salt Lake Community College*
The Influence of Mycorrhizal Associations on Monoterpene and Isoprene Emissions in Plants

UTAH VALLEY UNIVERSITY

Molly Christensen (Christian Draper), *Utah Valley University*
Measuring the Periods of Variable Stars in NGC 188

Mikaela Cowles (Joseph Jensen), *Utah Valley University*
The First SNAP Surface Brightness Fluctuation Distances

Tyler Daynes (Vern Hart), *Utah Valley University*
An Automated Stepper Motor-Driven System for Angular Sampling of High Scattering Angles

Jessica Johnson (Christian Draper), *Utah Valley University*
Modelling Filter Response of Galactic Emission Line Spectra

Benjamin Miera (Phil Matheson), *Utah Valley University*
Collisional Losses in a VASIMR (Variable Specific-Impulse Magnetoplasma Rocket)

James Morley (Kim Nielsen), *Utah Valley University*
Creating a System for Automated Imaging of Atmospheric Gravity Waves

Brayden Roberts (Joshua Lothringer), *Utah Valley University*
Atmospheric Modeling of Brown Dwarfs

Brian Seamons (Joshua Lothringer), *Utah Valley University*
Characterization, Comparison and Confirmation: Atmospheric Composition of WASP-39b with JWST

Jeremy Tait (Vern Hart), *Utah Valley University*
A Generative Adversarial Network for Image Reconstruction

Brantson Wayman & Alexander Gibb (York Young), *Utah Valley University*
Construction and Characterization of a Nd:YVO_4 Laser for Pumping a $BaGa_4Se_7$ Nonlinear Optical System

UTAH TECH UNIVERSITY

Taylor Millett (Sam Tobler), *Utah Tech University*
Hollow Hair and How its Structure helps Big Game Animals Thermoregulate

WEBER STATE UNIVERSITY

Ren Fisher, Justin Knighton, Tyler Adams (Christian Hearn), *Weber State University*
Open-Source Antenna Pattern Measurement System, Phase II

WESTMINSTER COLLEGE

Caitlin Christensen (Bonnie Baxter), *Westminster College*
Euhalothece: the Story of a Primary Producer and the Great Salt Lake Benthic Food Chain

Paulina Martinez-Koury (Bonnie Baxter), *Westminster College*
Preservation of Biosignatures in Gypsum as a Model for Mars Sample Return

TEAM POSTERS

BRIGHAM YOUNG UNIVERSITY

PHYSCIS AND AEROSPACE STUDENT-CENTERED ACOUSTICS LAB (PASCAL) TEAM (Kent Gee), *Brigham Young University*
Bradley Mclaughlin, Carson, Gardner, and Zachary Hendry
Acoustical Measurements of the Space Launch System Artemis-I Launch

BYU ROCKETRY HIGH POWER TEAM (David Fullwood), *Brigham Young University*
Scott Tuley, Riley Brown, Derrick Walker, and Bradley Hornfisher
BYU Rocketry 2023 IREC & Spaceport America Cup

UTAH STATE UNIVERSITY

USU GET-AWAY SPECIAL TEAM (Jan Sojka), *Utah State University*
Carter Page, Shawn Jones, Ben Willard, Bella Nielsen, Tyler Day, Taylor Rowser, Cooper Gowan, CJ Wayland, Warren Prescott, Jeremy Evans, Lorenzo High, Hunter Nelson, and Kade Angell
The GASRATS CubeSat: Testing an Optically Transparent, Solar Panel-Integrated Patch Antenna

USU ROCKET TEAM (Joel Ellsworth), *Utah State University*
Zachary Foster, Xavier Kipping, Tyler Gardner, Jorge Hernandez Ramiro, Xander Summers, Jonathon Thomsen, and Sam Murdock
USU 2023 Spaceport America Cup Competition

UNIVERSITY OF UTAH

UTAH STUDENT ROBOTICS TEAM (Mark Minor), *University of Utah*
Chandler Millar, Andrew Tolton, Daniel Robinson, Najman Husaini, Creed McCord, Hunter Strathman, Landen Hughes, Bradley Lund, Nathan Bruns, Rylan Metcalf, Jeremy Clark, Minh Le, Daniel Pruschki, Luke Phillips, Joseph Gilsoul, Simon Padgen, Tomas Hammond
The Archimedes Drum: Innovative Mining for NASA Lunabotics

NASA BIG IDEA CHALLENGE TEAM (Hong Yong Sohn), *University of Utah*
Collin Andersen, Jordan Contreras, Jarom Chamberlin, and John Otero
NASA BIG Idea Project: Production of Steel from Lunar Regolith through Carbonyl Iron Refining (CIR)

WEBER STATE UNIVERSITY

WSU ADVANCED PHYSICS LAB COHORT (John Armstrong), *Weber State University*
Teagan Della Cerra, Muon Shielding: Effects of Moon Shielding by Lead, Polyethylene, and Water
Mary Ghita, Cosmic Watch Muon Detector Case Builds and Radiation Event Counts
Ryan Gardner, Cosmic Ray Muons & True Random Numbers
Jade Marchant, Measuring Solar Activity with CosmicWatch Muon Detectors
Masen Pitts, Blotting Out the Sky: The Affects of Various Shielding Configurations on the Rate of Muon Interactions
Nathan Tanner, *Jade Marchant, and Matt Wilkinson*, Muons, Moody Weather & Many Lines of Code
Matt Wilkinson, Are They Really Muons? Determining the Viability of CosmicWatch Muon Detectors in 'Coincidence Mode'

Session 4 — Session Chair: Dr. Lara Brewer, University of Utah — Noorda Bldg, Rm 304
11:00 AM – 11:30 AM

11:00 AM **Nathan Coleman** (Larry Howell), *Brigham Young University*
Facilitation of Deployable Antennas using a Panel Structure Optimization Framework

11:10 AM **Katie Varela** (Spencer Magleby), *Brigham Young University*
A Preliminary Review and Discussion of Metrics for Origami-based Deployable Arrays

11:20 AM **Christine Case** (Stephen Whitmore), *Utah State University*
Comparing a 3-D Printed Hemispherical-Head and Rankine Body Probe Shapes for Very Low Speed Air Data Measurements

11:30 AM **Savanah Turner** (Denise Stephens), *Brigham Young University (PRERECORDED)*
Spectral Fits of Brown Dwarfs: Discovering Trends Across the Spectral Type Sequence

Session 5 — Session Chair: Dr. Joseph Orr, University of Utah — Noorda Bldg Rm 325
11:00 AM – 11:20 AM

11:00 AM **Noah Langenfeld** (Bruce Bugbee), *Utah State University*
Optimizing Nitrogen Use for Continuous Recycling in Closed Life Support Systems

11:10 AM **Natasha Wilson** (Julie Crockett), *Brigham Young University*
Experimental Characterization of Internal Wave Generation by Multiple Peak Topographies

11:20 AM **Jacob Johnson** (Randal Beard), *Brigham Young University*
Continuous-time Trajectory Estimation for Differentially Flat Systems

Session 6 — Session Chair: Dr. Christian Hearn, Weber State University — Noorda Bldg, Rm 326
11:00 AM – 11:20 AM

11:00 AM **Jared Payne** (Stephen Schultz), *Brigham Young University*
Fabrication of Metallic Far Infrared Filters

11:10 AM **Clayton Spencer** (Tianyi He), *Utah State University*
Development, Modeling and Performance Analysis of an Electric VTOL Aircraft with Tiltable Rotors

11:20 AM **Chase Oliphant** (Steve Gorrell), *Brigham Young University*
One-Dimensional Radial Turbomachinery Modeling

Wrap-up & Lunch — Noorda Bldg Forum, 1st floor

11:45 AM Feedback, wrap up, discussion of longitudinal tracking, Gateway reporting, evaluation surveys

12:00 PM Lunch combined with UNSGC Trustees and Deputy Trustees