25TH ANNUAL FELLOWSHIP SYMPOSIUM

UTAH NASA SPACE GRANT CONSORTIUM

6 MAY 2019

held at

BRIGHAM YOUNG UNIVERSITY ENGINEERING BUILDING

8:30-9:00 a.m. **Registration –** sign in and pick up materials

9:00 a.m. **Welcome and Introductions – Dr. Joseph Orr, Space Grant Director and Dr. David Long, Brigham Young University**

All participants meet together at 9:00 a.m. in 204 - will break into triple sessions for presentations at 9:10 a.m.

Sessions I/II/III and IV/V/VI will be dual sessions:
Sessions I & IV held in Room EB402
Sessions II & V held in Room EB302
Sessions III and VI held in Room EB204

Session I — Session Chair: Kai Kuck, *University of Utah*

Room # EB402

9:10 a.m. **Jaron Ellingson** (Cammy Peterson), *Brigham Young University*
Third-Person Autonomous Control using Deep RC

9:20 a.m. **Jared Butler** (Spencer Magleby), *Brigham Young University*
Implementing Origami-Based Mechanisms Through Modeling of Mechanical Advantage and Developing Self-Deploying Configurations

9:30 a.m. **Erik Hamilton** (Aaron Hawkins), *Brigham Young University*
High Sensitivity Bio-sensing via Three-Dimensional Hydrodynamic Focusing

9:40 a.m. **Tyler Gardner** (Stephen Whitmore), *Utah State University*
A Low-cost Trajectory Estimation System for Drones and Rockets

9:50 a.m. **Patrick Kolbay** (Kai Kuck), U*niversity of Utah*
Improving Technologies in Anesthesia

10:00 a.m. **Sean Ermer** (Lara Brewer), *University of Utah*
Automated Adverse Respiratory Event Detection in Volunteers Receiving Opiod Analgesics

Session II — Session Chair: Dr. Marc Killpack, *Brigham Young University*

Room # EB302

9:10 a.m. **Kylie Wolfe** (David Allred), *Brigham Young University*
Improving a Program to Test Optics for Space-Based Telescopes

9:20 a.m. **Phillip Hyatt** (Marc Killpack), *Brigham Young University*
Real-Time Nonlinear Model Predictive Control Using a Graphics Processing Unit

9:30 a.m. **Tate Fanning** (Steven Gorrell), *Brigham Young University*
Captivation Inception and Performance of a Centrifugal Impeller During Startup

9:40 a.m. **Louis Tonc** (Geordie Richards), *Utah State University*
Orbit Estimation from Angles-Only Observations Using Nonlinear Filtering Schemes

9:50 a.m. **Shelby Chatlin** (Christian Hearn), *Weber State University*
Open Source Antenna Pattern Measurement System

10:00 a.m. **Paul Kusuma** (Bruce Bugbee), *Brigham Young University*
Optimizing Concentration Mirrors and Fiber Optics for Food Production on Mars

Session III Session Chair: Dr. Michael Wirthlin, *Brigham Young University*

Room # EB204

9:10 a.m. **Andrew Keller** (Michael Wirthlin), *Brigham Young University*
Terrestrial Cosmic Ray Induced Soft Errors and Large-Scale FPGA Systems in the Cloud

9:20 a.m. **Taylor McDonnell** (Andrew Ning), *Brigham Young University*
Gradient-Based Optimization of Solar-Regenerative High-Altitude Long-Endurance Aircraft

9:30 a.m. **Gary Ellingson** (Tim McLain), *Brigham Young University*
Progress on GPS-Denied, Multi-Vehicle, Fixed-Wing Cooperative Localization

9:40 a.m. **Arun Bernard** (David Geller), *Utah State University*
Spacecraft Attitude Determination Using Ground Based Photometry: A Comparison of Estimation Algorithms

9:50 a.m. **Kyle Burk** (Joseph Orr), *University of Utah*
Administering Model-based Patient-specific Supplemental Oxygen Therapy

10:00 a.m. **Stanley Fujimoto** (Mark Clement), *Brigham Young University*
The Polygraph: A Data Structure for Genome Alignment and Variation Detection

Poster Session & Break *10:15-10:55 a.m.*

Posters presented by students with Q&A session

D. Jacob Butterfield (Julie Crockett), *Brigham Young University*
Boiling Heat Transfer of Impinging Jets on Superheated Superhydrophobic Surfaces

Shelby Chatlin (Christian Hearn), *Weber State University*
Open Source Antenna Pattern Measurement System

Adrik Z. Da Silva and Jessie Kochaver (Bonnie Baxter), *Westminster College*
Great Salt Lake Halophilic Archaea: A Model for Mineral Entrapment of Life

Forrest Goodman, Anh Phan, and Rebecca Sundtrom (Kim Nielsen), *Utah Valley University*
Introducing Cosmic Rays to UVU

Ryan Lawton and Danielle Haverkamp (John Sohl), *Weber State University*
A Miniaturized Multi Sensor Array for Balloon-Borne Air Measurements, Phase I

James Loveless, Michael Burt and Joshua Baum (Phil Matheson & Ray Perkins), *Utah Valley University*
Gearing Up for a Launch of a VASIMR Rocket at UVU

Katerina Merrill and Jason Sheetz (Kim Nielsen), *Utah Valley University*
UVU – Japan Aeronomy Collaboration

Cory Ortiz (Gary Stewardson), *Utah State University*
The Collegiate ROAVcopters Challenge

Cameron Palmer (Sam Tobler), *Dixie State University*
Resistivity Measurements of Nickel Silicide

Ryan Rainey, **Mason Acree, and Gunnar Jensen** (Vern Hart), *Utah Valley University*
Use of Machine Learning for Non-Invasive Identification of Tumors

Emily Zhao (Brad Bundy), *Brigham Young University*
Advancing Space Flight Medical Care through On-demand Protein Therapeutic Production Capabilities

Team Posters

BYU ROCKETRY TEAM (David Fullwood & Andrew Ning), *Brigham Young University*
Mark Johnson, Bradley Buttars, and Riley Meik
BYU Rocketry: 2018 IREC & Spaceport America Cup

USU GET-AWAY SPECIAL TEAM (Jan Sojka), *Utah State University*
Alex Nelson, Chaz Cornwall, Jack Danos, Caleb Smith, Kaden Ledbetter, Nick Clark, Kelly Burch, Scott Glaittli, Logan Voigt, Eric Manuel, Emma Hind, Andrew Hendricks, Jack Kiefer, Philip Nelson, Eric Eastham, Sam Dalrymple, Chase Barton, Thomas Smith, Eli Diederich, Ammon Hepworth, Hailee Maxwell
Deployable Rigid Inflatable for a 1U CubeSat

UTAH STUDENT ROBOTICS TEAM (Justin Schramm), *University of Utah*
David Purcell, Cole Mortensen, Edward Goodell, Tina Hayward, Ben Engel, Mark Howell, Nathan Blas, Sasha McKee, James Ehlers, Sebastian Jenson, Riian Simpson, Ali Almiskeen, Alex Charters, Dawn Sweeney, Jonathan Warner, Logan Peterson, Joshua Miraglia, and Hayden LeBaron
Martian Mining: Designing a Modular Autonomous Robotic System

Session IV Session Chair: Dr. Matthew Linford, *Brigham Young University*
Room # EB402

11:00 a.m. **Brian Johnson** (Matthew Linford), *Brigham Young University*
Real-Time Monitoring of Aluminum Oxidation Through Wide Band Gap MgF_2 Layers for Protection of Space Mirrors

11:10 a.m. **Jason Huang** (Kai Kuck), *University of Utah*
Model-Based Propofol Dosing to Improve Control of Patient EEG Dynamics

11:20 a.m. **Tara Bishop** (Sam St. Clair), *Brigham Young University*
Hotspot Analysis Reveals Large Landscape Controls Over Cheatgrass (*Bromus tectorum*)

Session V Session Chair: Dr. Joseph Orr, University of Utah
Room # EB302

11:00 a.m. **Matthew Robertson** (JR Dennison), *Utah State University*
Surface Modification Influences on Electron Yield

11:10 a.m. **Benjamin Brownlee** (Brian Iverson), *Brigham Young University*
3D Interdigitated Electrodes for Point-of-Care Electochemical Biosensing

11:20 a.m. **Derek Sanchez** (Troy Munro), *Brigham Young University*
Microfluidic Temperature Behavior in a Multi-Material 3D Printed Chip

Session VI Session Chair: Dr. Mark Colton, *Brigham Young University*
Room # EB204

11:00 a.m. **Matthew Cannon** (Michael Wirthlin), *Brigham Young University*
Improving SRAM FPGA Radiation Reliability Through Low-Level TMR Implementation

11:10 a.m. **Jonathan Burnett** (Daniel Maynes), *Brigham Young University*
Thermal Transport to Droplets Impinging on Heated, Superhydrophobic Surfaces

11:20 a.m. **Alexander Petrie** (Chiang Wood), *Brigham Young University*
A 10-bit SAR ADC with an Ultra-Low Power Supply

Student Feedback Sessions/Posters

11:35-11:50 a.m. Student Feedback from Session Chairs and Session Reviewers

Lunch — Engineering Building, Main Level, Rm 204

12:00 Lunch combined with UNSGC Trustees and Deputy Trustees