

# 45<sup>th</sup> ANNUAL AAS GUIDANCE & CONTROL CONFERENCE

February 2 – February 8, 2023

Sponsored by the American Astronautical Society  
Rocky Mountain Section

**Please see our website: <http://aas-rocky-mountain-section.org/> to submit an abstract and obtain additional information on the Conference**

**Please contact the Conference Chairperson with inquiries related to the proceedings:**  
Harvey Mamich, Lockheed Martin, [harvey.r.mamich@lmco.com](mailto:harvey.r.mamich@lmco.com)

**September 9, 2022 Paper and Poster Abstracts are due (submit through the [website](#))**

## TENTATIVE CONFERENCE AGENDA SUMMARY

### Registration

Room check-in at the Beaver Run Resort front lobby from 4:00 PM daily.

Conference registration from 6:00 to 10:00 AM and from 4:00 to 6:00 PM daily at the conference center.

Buffet Breakfast Daily from 6:00AM – 9:00AM (Saturday Feb. 4<sup>th</sup> – Wed. Feb. 8<sup>th</sup>)

### Thursday February 2, 2023

8:30 AM – 11:30 AM Classified Advances in GN&C (TBD CO)

12:30 PM – 3:30 PM Classified Advances in GN&C (TBD CO)

### Friday February 3, 2023

8:30 AM – 11:30 AM Classified Recent Experiences (TBD CO)

6:00 PM – 9:00 PM Conference Opening Reception (Beaver Run Resort, Breckenridge, CO)

### Saturday February 4, 2023

7:30 AM – 10:30 AM Session I: Student Innovations in GN&C

5:00 PM – 8:00 PM Session II: Technical Exhibits

### Sunday February 5, 2023

7:00 AM – 10:30 AM Technical Sessions

5:00 PM – 7:00 PM Technical Sessions

7:30 PM – 10:00 PM Casino Night

### Monday February 6, 2023

7:00 AM – 10:00 AM Technical Sessions

10:30 AM – 3:30 PM Tutorial Session

4:00 PM – 6:00 PM Technical Sessions

6:15 PM – 7:30 PM Industry Panel Discussion & Cocktail Hour

### Tuesday February 7, 2023

7:00 AM – 10:00 AM Technical Sessions

10:30 AM – 3:30 PM Tutorial Session

4:00 PM – 7:00 PM Technical Sessions

### Wednesday February 8, 2023

7:00 AM – 10:00 AM Recent Experiences Session

## **CONFERENCE DETAILS**

**Thursday, February 2 and Friday, February 3, 2023**

### **Classified Sessions (TBD, CO)**

**Thursday 8:30 AM – 3:30 PM**

**Friday 8:30 AM – 11:30 AM**

The classified sessions will be held at TBD, Colorado. All eligible conference participants may attend the session presentations. After the sessions conclude Friday at 11:30 AM, participants can make the drive to Breckenridge. Participants must provide their own transportation to the conference venue.

Attendees must possess the necessary clearances prior to registration.

Pre-registration is required and will be controlled (walk-ins will NOT be admitted). Further details on the registration process will be forthcoming with the second conference mailing.

For those interested in submitting an abstract for the classified session, contact one of the session organizers for instructions.

### **Friday, February 3, 2023**

#### **Conference Welcome Reception (Breckenridge, CO) 6:00-9:00 PM**

The conference welcome reception will be held in the Imperial Ballroom at the Beaver Run Resort in Breckenridge on Friday evening. This will be an opportunity to learn more details about the specifics of the planned program, meet new colleagues and renew connections with old friends. Early conference registration will be available from 6:00 PM to 8:00 PM.

## Saturday, February 4, 2023

### Morning: 7:30-10:30 AM Session I - Student Innovations in GN&C

**THEME:** This session embraces the wealth of research and innovative projects related to spacecraft GN&C being accomplished in the university setting. Papers in this session address hardware/software research as well as component, system, or simulation advances. Papers submitted must have a student as the primary author and presenter. Papers will be adjudicated based on level of innovation, complexity of problem solved, perceived technical readiness level, applicability and fieldability to near-term systems, clarity of written and verbal delivery, number of completed years of schooling and adherence to delivery schedule. The session will be limited to 8 papers with the top 3 papers receiving monetary awards.

#### Organizers

Ian Gravseth, Ball Aerospace, [igravseth@ball.com](mailto:igravseth@ball.com)

David Chart, Sierra Nevada Corporation, [david.chart@sncorp.com](mailto:david.chart@sncorp.com)

#### National Chairpersons

David Geller, Utah State University, [david.geller@usu.edu](mailto:david.geller@usu.edu)

Luke Sauter, US Air Force Academy, [luke.sauter@usafa.edu](mailto:luke.sauter@usafa.edu)

### Mid-Day 10:00 – 4:30 STEMscape

In keeping with the spirit of the conference to develop the next generation of engineers, the conference will again host STEMscape – an outreach to over 100 local high school students and educators.

#### Organizers

Mike Drews, Lockheed Martin Space, [michael.e.drews@lmco.com](mailto:michael.e.drews@lmco.com)

Meredith Stephens, Ball Aerospace, [mlstephe@ball.com](mailto:mlstephe@ball.com)

### Afternoon: 5:00-8:00 PM Session II - Technical Exhibits

**THEME:** The Technical Exhibits Session is a unique opportunity to observe displays and demonstrations of state-of-the-art hardware, design and analysis tools, and services applicable to advancement of guidance, navigation, and control technology. The latest commercial tools for GN&C simulations, analysis, and graphical displays are demonstrated in a hands-on interactive environment, and include lessons learned and undocumented features. Associated papers not presented in other sessions are also provided and can be discussed with the author. Come enjoy and excellent complimentary buffet and interact with the technical representatives and authors. This session takes place in a social setting and family members are welcome!

#### Organizers

Andrew Riskus, Ball Aerospace, [ariskus@ball.com](mailto:ariskus@ball.com)

Graeme Ramsey, Lockheed Martin Space, [graeme.d.ramsey@lmco.com](mailto:graeme.d.ramsey@lmco.com)

## **CONFERENCE TECHNICAL SESSION TOPICS (Schedule TBD)**

The remaining sessions will be scheduled between Sunday, February 5<sup>th</sup> at 7:00 AM, and Wednesday, February 8<sup>th</sup> at 10:00 AM. The exact schedule is still being determined. Tutorial sessions will be scheduled in between the technical sessions on Monday and Tuesday.

### **Advances in GN&C Hardware**

**THEME:** Many programs depend on heritage, but the future is advanced by those willing to design and implement new and novel architectures, technologies, and algorithms to solve GN&C problems. This session is open to papers with topics ranging from theoretical formulations to innovative systems and intelligent sensors that will advance the state of the art, reduce the cost of applications, and speed the convergence to hardware, numerical, or design trade solutions.

#### **Organizers**

Keith Mahoney, Lockheed Martin Space, [keith.mahoney@lmco.com](mailto:keith.mahoney@lmco.com)

#### **National Chairperson(s)**

Steeve Kowaltschek, European Space Agency - Agence Spatiale Européenne, [steeve.kowaltschek@esa.int](mailto:steeve.kowaltschek@esa.int)

### **Advances in GN&C Software**

**THEME:** Successful GN&C system performance is often dependent on innovative software. This session is open to all development processes and systems ranging from vehicle code used to operate the spacecraft system, ground software used for operations/analysis, or simulations/frameworks used to test, validate or develop GN&C systems. The intent is to include current best practices as well as challenges in future software development such as the inclusion of complex systems like artificial intelligence, machine learning, vision processing, and iterative numerical solvers.

#### **Organizers**

Levi Smith, Lockheed Martin, [levi.a.smith@lmco.com](mailto:levi.a.smith@lmco.com)

#### **National Chairperson(s)**

Paul Graven, Cateni Inc, [paul@graven.com](mailto:paul@graven.com)

Patrick Kenneally, NASA Jet Propulsion Laboratory, [patrick.kenneally@gmail.com](mailto:patrick.kenneally@gmail.com)

### **Advances in Navigation**

**THEME:** Recent advances in navigation seek to push the boundaries of spacecraft navigation technology and address the shortcomings of current navigation systems. With the prospect of deploying large-scale constellations in Earth orbit and the need for maintaining a safe orbital environment for all operators, new navigation techniques and robust architectures are required to complement the existing ground-based and GNSS systems. Other future lunar, interplanetary, and interstellar mission concepts require novel ways for collecting and processing observations from non-traditional sources. In this session, we will explore novel and advanced ground-based, space-based, and autonomous spacecraft navigation approaches. Of particular interest are methods for inter-satellite navigation and lost-in-space scenarios as well as new filtering techniques for processing optical observations, pulsar observations, and other deep space signals of opportunity. As the world continues to work towards expanded lunar exploration and long-term habitation, new techniques, algorithms, and technology are needed to enable in-situ autonomous exploration in cislunar space.

#### **Organizers**

Erin Griggs, Trusted Space, [erin.griggs@trustedspace.com](mailto:erin.griggs@trustedspace.com)

Uday Shankar, JHU Applied Physics Laboratory, [uday.shankar@jhuapl.edu](mailto:uday.shankar@jhuapl.edu)

#### **National Chairperson(s)**

Evan Anzalone, NASA Marshall Space Flight Center, [evan.j.anzalone@nasa.gov](mailto:evan.j.anzalone@nasa.gov)

Chris Dsouza, NASA Johnson Space Center, [chris.dsouza-1@nasa.gov](mailto:chris.dsouza-1@nasa.gov)

## **Advances in Propulsion**

**THEME:** The development of advanced propulsion technologies is critical for enabling spacecraft platforms ranging from CubeSats to ambitious human and robotic space exploration missions. Innovative developments in chemical, electric, nuclear, and propellantless propulsion will provide higher performance and greater operability, enabling new approaches ranging from launch to interstellar travel. This session will highlight advanced propulsion technologies and enabling subsystems matured by NASA, DOD, industry, and academia.

### **Organizers**

John Abrams, Analytical Mechanics Associates, Inc., [j.abrams@ama-inc.com](mailto:j.abrams@ama-inc.com)

Jeffrey Parker, Advanced Space, [parker@advancedspace.com](mailto:parker@advancedspace.com)

### **National Chairperson(s)**

Jeff Sheehy, NASA Space Technology Mission Directorate, [jeffrey.sheehy@nasa.gov](mailto:jeffrey.sheehy@nasa.gov)

## **Autonomous Control of Multiple Spacecraft**

**THEME:** Satellite constellations are nothing new, but the sizes, scales and configurations of modern Distributed Satellite Systems (DSS) are reaching unprecedented levels of scope and complexity. These configurations include constellations, swarms and various fractionated architectures. Recent demonstrations of these DSS systems show that handling the planning, coordination and operations associated with large-scale constellations is a critical logistical problem that must be addressed for continued effective application of these systems. In addition to the logistical challenges, large and small multi-spacecraft systems must also work through operational complexities such as autonomy, formation flying, fractionation, docking, structural assembly, tethering, station keeping for sparse aperture configurations and on-orbit servicing and reconfiguration. Some key system and subsystem challenges for DSS include: formation control, rendezvous management, expanded autonomous control, on-orbit calibration, station keeping, space traffic management, and human-interfacing with the DSS. Any and all papers related to these topics are welcome.

### **Organizers**

Kevin Goettsche, Ball Aerospace, [kgoettsc@ball.com](mailto:kgoettsc@ball.com)

Matt Sandnas, SEAKR Engineering, Inc, [matt.sandnas@seakr.com](mailto:matt.sandnas@seakr.com)

### **National Chairpersons**

Hanspeter Schaub, University of Colorado, [hanspeter.schaub@colorado.edu](mailto:hanspeter.schaub@colorado.edu)

Jekan Thanga, Arizona University, [jekan@arizona.edu](mailto:jekan@arizona.edu)

## **Autonomous RPOD, Servicing, Collision Avoidance**

**THEME:** With each passing year, the utilization of space and complexity of space systems continues to grow at an ever-increasing rate. Autonomous rendezvous, proximity operations, and docking (RPOD) are key enablers to supporting objectives such as maintaining the International Space Station or placing boots on the lunar surface again. Additionally, there is continued interest in the commercial servicing of existing spacecraft and removing orbital debris. This session explores all aspects of enabling technologies for Navigation, Guidance and Control, Computer Vision, Robotics, and Safety of Flight to support this class of missions.

### **Organizers**

DeAnn Redlin Sanders, Draper, [dredlinsanders@draper.com](mailto:dredlinsanders@draper.com)

Brady Young, Lockheed Martin Space, [brady.young@lmco.com](mailto:brady.young@lmco.com)

### **National Chairpersons:**

Islam Hussein, Thornton Tomasetti, [ihussein@thorntontomasetti.com](mailto:ihussein@thorntontomasetti.com)

Jack Brazzel, NASA Johnson Space Center, [jack.brazzel@nasa.gov](mailto:jack.brazzel@nasa.gov)

## Entry, Descent & Landing GN&C

**THEME:** Entry, descent, and landing technologies enable surface exploration of celestial bodies and the safe return of payloads to Earth. Recent advances in powered flight guidance and in atmospheric entry systems have improved landed mass capability to Mars, and has made the reuse of launch vehicle first stages commonplace on Earth. Continued advancements through the collaboration of government, industry and academia will enable even more ambitious capabilities and missions in the future. This session provides a venue for discussing advanced hypersonic entry vehicles, coupled with guidance, navigation and control technologies for powered and unpowered descent and landing systems. Topics include precision navigation and targeting, novel guidance and control methodologies, hazard avoidance, and controlled landings.

### Organizers

Jim Chapel, Lockheed Martin Space, [jim.d.chapel@lmco.com](mailto:jim.d.chapel@lmco.com)

Jennifer Goss, Sierra Nevada Corp, [jennifer.goss@sncorp.com](mailto:jennifer.goss@sncorp.com)

### National Chairpersons

Sam Thurman, Jet Propulsion Laboratory, [sam.w.thurman@jpl.nasa.gov](mailto:sam.w.thurman@jpl.nasa.gov)

Henry Cordova, NASA Johnson Space Center, [henry.s.cordova@nasa.gov](mailto:henry.s.cordova@nasa.gov)

## Exploring Frontiers - The Moon and Mars

**THEME:** In recent years, the exploration and habitation of both the Lunar surface and Mars has become popularized in the commercial and private aerospace communities. With the Moon as the closest celestial body, and Mars as the closest and most hospitable planet near Earth, they are the most obvious next steps in human space exploration. Exploring both bodies poses a unique set of challenges in navigation, entry into a highly variable atmosphere, radiation resistance, and autonomous exploration. This session will explore the difficulties present in exploring the Moon and Mars and the innovative GN&C technologies and spacecraft operations that will aid in the manned and unmanned exploration of these bodies.

### Organizers

Jatesh Sud, Blue Origin, [jsud@blueorigin.com](mailto:jsud@blueorigin.com)

Cody Griffin, Sierra Nevada Corporation, [cody.griffin@sncorp.com](mailto:cody.griffin@sncorp.com)

### National Chairpersons

Renato Zanetti, University of Texas at Austin, [renato@utexas.edu](mailto:renato@utexas.edu)

Nujoud Merancy, NASA Johnson Space Center, [nujoud.merancy@nasa.gov](mailto:nujoud.merancy@nasa.gov)

## Final Approach and Docking Contact Dynamics

**THEME:** Rendezvous and Proximity Operations continue to develop into more and more relevant fields for research with each passing year. With the availability of docking, business models from deorbit to refueling are enabled, as well as the next generation of space tugs and asteroid missions. Many of these require coordination between GNC teams and Mechanism teams working to build physical docking interfaces and hardware. As such, complex requirements around capture boxes, concepts of operations, simulation of contact dynamics and GNC control handovers within the last meters are all relevant areas of research. This session focuses on research that occurs in this final phase of close approach and after when two vehicles are docked and includes GNC, Mechanism and inter-spacecraft cooperation and collaboration.

### Organizers

Ellis King, Lockheed Martin Space, [ellis.king@lmco.com](mailto:ellis.king@lmco.com)

Jim Carrillo, Blue Origin, [jamespcarrillo@gmail.com](mailto:jamespcarrillo@gmail.com)

### National Chairpersons

James Bultitude, Orbit Fab, Inc, [james@orbitfab.com](mailto:james@orbitfab.com)

## Human Spaceflight/Deep Space Gateway

**THEME:** NASA and its commercial and international partners strive to bring astronauts to new Lunar, asteroid and Martian destinations, increasingly new and innovative GN&C technologies will be required to transport and deliver crews and return them safely to the Earth. There is an increased urgency with NASA awarding the first Human Landing System (HLS) to land the first woman and next man on the surface of the Moon as early as 2025. Orion and Space Launch System (SLS) programs approach their final stages of development, new systems such as the Deep Space Gateway and Lunar Landers are being developed as the next steps to reach Mars in the coming decades. This session explores key advancements in automation, guidance, navigation and Fault Detection/Isolation (FDI) technologies which will ultimately enable human exploration onto lunar bases and beyond.

### Organizers

Alyssa Farber, Lockheed Martin Space, [alyssa.farber@lmco.com](mailto:alyssa.farber@lmco.com)  
Nick Rahaim, Lockheed Martin Space, [nicholas.rahaim@lmco.com](mailto:nicholas.rahaim@lmco.com)

### National Chairpersons

Tim Straube, NASA Johnson Space Center, [timothy.m.straube@nasa.gov](mailto:timothy.m.straube@nasa.gov)

## Image Processing for Navigation

**THEME:** Image Processing (IP) is a critical step in many GN&C and ADCS algorithms, including attitude determination from star cameras and optical navigation from imaging sensors. Applications occur in various mission phases including interplanetary cruise, planetary orbit, proximity operations, descent and landing, and surface operations. An image from a visible, IR, LIDAR, or similar sensor can offer a wealth of information about a space vehicle's navigation state, but this information must be distilled into measurements that can be ingested by a navigation algorithm. Therefore, the success of algorithms which rely on image data depends on how effectively these algorithms perform IP---defined here as the process of extracting the salient pieces of information from an image in the presence of noise, clutter, and other real-world issues. This session is dedicated to papers that explore the relationship between IP algorithms and the broader problem of GN&C. Topics include IP algorithms; feedback/feedforward between IP and GN&C; hosting platforms/architectures between CPUs, FPGAs, GPUs and other processing units; challenges with on-board real-time IP; on-board rendering; testing, verification and validation of IP algorithms; and lessons learned from past experiences.

### Organizers

Ellis King, Lockheed Martin Space, [ellis.king@lmco.com](mailto:ellis.king@lmco.com)  
Adam Boylston, Analytical Mechanics Associates, [adam.d.boylston@ama-inc.com](mailto:adam.d.boylston@ama-inc.com)

### National Chairperson(s)

Nikolas Trawny, NASA Jet Propulsion Laboratory, [nikolas.trawny@jpl.nasa.gov](mailto:nikolas.trawny@jpl.nasa.gov)  
Adam Coralie, Kinetx Aerospace, [coralie.adam@kinetx.com](mailto:coralie.adam@kinetx.com)  
John Christian, Georgia Institute of Technology, [john.a.christian@gatech.edu](mailto:john.a.christian@gatech.edu)

## Launch Vehicle GN&C

**THEME:** Developing advanced technologies and applying new operational approaches to launch systems is critical to increase the flexibility, affordability, and performance of advanced systems for space access. This may include air-breathing, hypersonic stages; air launched vehicles; methods for system reuse; and optimization of the trajectory and control of the mission. The session will highlight both the technologies and operations of advanced launch systems, including challenges and solutions of such approaches with respect to guidance, navigation, and control.

### Organizers

Tom Knight, Sierra Nevada Corporation, [tom.knight@sncorp.com](mailto:tom.knight@sncorp.com)

### National Chairpersons

John Reed, United Launch Alliance, [john.g.reed@ulalaunch.com](mailto:john.g.reed@ulalaunch.com)  
Cary Maunder, Blue Origin, [CMaunder@blueorigin.com](mailto:CMaunder@blueorigin.com)

## Pioneers

**THEME:** This session will offer reflections on the careers and contributions of scientists and engineers who pioneered notable technical solutions for our aerospace community and highlight significant technological advances that led to historical achievements in the space industry.

### Organizers

Larry Germann, Left Hand Corp , [germannl@lefthand.com](mailto:germannl@lefthand.com)

Lee Barker, Lockheed Martin Space, [lee.a.barker@lmco.com](mailto:lee.a.barker@lmco.com)

### National Chairpersons

John Goodman, Odyssey Space Research, [jgoodman@odysseysr.com](mailto:jgoodman@odysseysr.com)

Tooraj Kia, NASA Jet Propulsion Laboratory, [tooraj.kia@jpl.nasa.gov](mailto:tooraj.kia@jpl.nasa.gov)

## Recent Experiences

**THEME:** This session focuses on recent experiences in spaceflight GN&C, providing a forum to share insights gained through successes and failures. Discussions typically include GN&C experiences ranging from Earth orbiters to interplanetary spacecraft. This session is a traditional part of the conference and has shown to be most interesting and informative.

### Organizers

Heidi Hallowell, Ball Aerospace, [hhallowe@ball.com](mailto:hhallowe@ball.com)

Jastesh Sud, Lockheed Martin Space, [jastesh.sud@lmco.com](mailto:jastesh.sud@lmco.com)

### National Chairpersons

David Dannemiller, NASA Johnson Space Center, [david.p.dannemiller@nasa.gov](mailto:david.p.dannemiller@nasa.gov)

Bill Frazier, NASA Jet Propulsion Laboratory, [william.e.frazier@jpl.nasa.gov](mailto:william.e.frazier@jpl.nasa.gov)

## SLS Core Stage TVC Development

**THEME:** The Space Launch System (SLS) is NASA's next-generation exploration-class launch vehicle for space access, providing a capability to loft as much as 290,000 lbm to low Earth orbit (LEO) in its Block 2 configuration. Three-axis control and stabilization during powered flight is provided by coordinated thrust vectoring of the solid rocket nozzles as well as all four RS-25E core stage engines, using 12 Space Shuttle heritage quad-redundant hydraulic thrust vector control (TVC) actuators. Integration of the hydraulic TVC actuators and RS-25 engines with a new core stage structure, avionics, and hydraulic system introduced numerous development, modeling, test, and validation challenges in preparation for the first flight. In this session, the engineering and development team provides a comprehensive survey of the design of the SLS Core Stage TVC system, the approach developed by the cross-discipline teams and NASA SLS Vehicle Management (VM) for verifying performance prior to flight, and lessons learned during cold gimbaling and all-up hot fire testing of the integrated system at the Stennis Space Center (SSC) B-2 test facility in March of 2021.

### Organizers

Lee Barker, Lockheed Martin Space, [lee.a.barker@lmco.com](mailto:lee.a.barker@lmco.com)

Larry Germann, Left Hand Corp, [germannl@lefthand.com](mailto:germannl@lefthand.com)

### National Chairperson(s)

Jeb Orr, Mclaurin Aerospace, [jeb.orr@mclaurin.aero](mailto:jeb.orr@mclaurin.aero)

John Wall, NASA Marshall Space Flight Center, [john.w.wall@nasa.gov](mailto:john.w.wall@nasa.gov)



## Small Body Exploration

**THEME:** Recent years have seen an amazing array of planetary exploration missions to asteroids, comets, and other small solar system objects, with several new missions in various phases of development. This has led to the practical application of innovations in optical navigation, sensors, modeling, and autonomy that are essential to accomplish demanding mission objectives, such as characterizing the small body after arrival, operating in a micro-gravity environment, and in some cases navigating to the surface. This session solicits GN&C experiences, successes, lessons learned, and future challenges associated with the exploration of asteroids, comets, and other small bodies, and how these GN&C capabilities may be applied to other exploration applications.

### Organizers

Dan Kubitschek, Laboratory for Atmospheric and Space Physics, [daniel.kubitschek@lasp.colorado.edu](mailto:daniel.kubitschek@lasp.colorado.edu)  
Siamak Hesar, Kayhan Space Corp, [siamak@kayhanspace.com](mailto:siamak@kayhanspace.com)

### National Chairpersons

Adam Coralie, Kinetx Aerospace, [coralie.adam@kinetx.com](mailto:coralie.adam@kinetx.com)  
Jay McMahon, University of Colorado, [jay.mcmahon@colorado.edu](mailto:jay.mcmahon@colorado.edu)

## Small Satellite GN&C

**THEME:** In recent years, small satellites including NanoSats and CubeSats have seen greater use for a range of applications in government, commercial, and educational sectors. At the high end of this mass range, ESPA-class spacecraft are now trusted platforms for scientific and defense missions. These missions require advanced technology insertion (GN&C, on-board processing) while advancing manufacturing practices to achieve higher production rates. Some key challenges related to increasing production volume include: supply-chain management, automated production and testing, and design for manufacturing approaches. This session is open to papers covering advanced technology insertion on small sats (e.g. propulsion, optical communications, proximity operations, drag sails, etc), advanced manufacturing practices (e.g. best practices for satellite production, automation and design for manufacturing) and operation practices (autonomous mission or conops). Papers on practical mission experience in these areas are welcomed.

### Organizers

DeAnn Redlin Sanders, Draper, [dredlinsanders@draper.com](mailto:dredlinsanders@draper.com)  
Lee Barker, Lockheed Martin Space, [brady.young@lmco.com](mailto:brady.young@lmco.com)

### National Chairperson(s)

Scott Palo, University of Colorado at Boulder, [palo@colorado.edu](mailto:palo@colorado.edu)

## Using AI/ML in GN&C

**THEME:** As Guidance, Navigation and Control algorithms become increasingly autonomous, there is a natural progression towards incorporating cutting edge Artificial Intelligence (AI) and Machine Learning (ML) technologies into the capabilities of today's autonomous systems. When combined with established systems and control theory, AI and ML algorithms can harness the wealth of information available from data obtained by sensors and cyberphysical systems over time. This session will highlight research and demonstrations focused on the theory and methods of learning, control, and computational intelligence for GN&C systems. Some example topics for this session include novel applications of AI systems in traditional GN&C systems, performance comparisons between classical GN&C methods and ones that leverage AI or ML, and demonstrations of design and/or test of GN&C systems that utilize ML.

### Organizers

Harrison Steadman, Lockheed Martin Space, [harrison.steadman@lmco.com](mailto:harrison.steadman@lmco.com)  
AJ Berning, Blue Origin, [aberning2@blueorigin.com](mailto:aberning2@blueorigin.com)

### National Chairpersons

Evangelos Theodorou, Georgia Institute of Technology, [evangelos.theodorou@gatech.edu](mailto:evangelos.theodorou@gatech.edu)

**Note to Authors:**

**Abstracts are due by September 9, 2022.**

We will continue to emphasize a 'paperless' method for collecting and distributing papers. Wireless service will be available at the conference.

Please submit paper and poster abstracts through the conference website, <http://aas-rocky-mountain-section.org/>

Additional conference details are also available on the website