41st ANNUAL AAS GUIDANCE & CONTROL CONFERENCE

February 1 – February 7, 2018

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***

TENTATIVE CONFERENCE AGENDA SUMMARY

September 8, 2017 **Paper and Poster Abstracts are due (submit through the website form)**

Buffet Breakfast & Poster Viewing Daily from 6:00AM – 9:00AM (Saturday Feb. 4th – Wed. Feb. 8th)

Thursday February 1, 2018

8:30 AM – 11:30 AM	Classified Advances in GN&C (The Aerospace Co, Colorado Springs CO)
12:30 PM – 3:30 PM	Classified Advances in GN&C (The Aerospace Co, Colorado Springs CO)

Friday February 2, 2018

8:30 AM – 11:30 AM	Classified Recent Experiences (The Aerospace Co, Colorado Springs CO)
6:00 PM – 9:00 PM	Conference Opening Reception

Saturday February 3, 2018

7:00 AM – 10:30 AM	Student Innovations in GN&C
5:00 PM – 7:00 PM	Session II: Technical Exhibits

Sunday February 4, 2018

7:00 AM – 10:30 AM	Technical Sessions, Poster Focus Time
11:00 AM – 1:30 PM	Tutorial Session “Beyond the Textbook”
2:00 PM – 4:00 PM	Technical Sessions

Monday February 5, 2018

7:00 AM – 10:00 AM	Technical Sessions
10:30 AM – 3:30 PM	Tutorial Session “Beyond the Textbook”
4:00 PM – 7:00 PM	Technical Sessions

Tuesday February 6, 2018

7:00 AM – 10:00 AM	Technical Sessions
10:30 AM – 3:30 PM	Tutorial Session “Beyond the Textbook”
4:00 PM – 7:00 PM	Technical Sessions

Wednesday February 7, 2018

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

CONFERENCE SESSION DETAILS

Thursday February 1st and Friday February 2nd, 2018

Classified Session

Thursday 8:30 AM – 3:30 PM, Friday 8:30 AM – 11:30 AM

AAS GN&C "Classified Advances in GN&C" and "Classified Recent Experiences" Sessions (Denver, CO)

There will be two classified sessions on Advances in GN&C and Recent Experiences, on Thursday 1 February and the morning of Friday 2 February, 2018. All eligible conference participants may attend the session presentations.

The sessions will be held at The Aerospace Corporation, Colorado Springs Conference Facility. This facility is approximately a 90 minute drive south from Denver International Airport (DIA) and 5 minutes from the Colorado Springs Airport. After the sessions conclude Friday at 11:30 AM, participants can make the ~2 hour drive to the conference venue in Breckenridge. Participants must provide their own transportation to The Aerospace Facility and to the conference venue.

The sessions will be held at the TOP SECRET//SI/TK//NOFORN level. Attendees must possess the necessary clearances prior to registration.

Pre-registration is required and will be controlled (walk-ins will NOT be admitted). Attendees registered for the entire AAS conference to be eligible to attend these sessions. A classified session only registration will be available for those who possess the necessary clearance and are unable to attend the full conference.

Organizers

Kyle Miller, Ball Aerospace & Technologies Corp., kbmiller@ball.com, 303-533-4348
Cheryl Walker, Lockheed Martin Space Systems, cheryl.a.walker@lmco.com, 303-977-2149
Shawn McQuerry, Lockheed Martin Coherent Technologies, shawn.c.mcquerry@lmco.com, 303-729-4425

Conference Opening Reception
Friday February 2nd, 6:00-9:00 PM

Friday evening 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.

Poster Session, Feb. 3 – Feb. 7, 2018

Poster Focus Session and in Break Room during Breakfast for the Duration of the Conference

The Poster Session offers a unique forum for authors and interested parties to discuss relevant topics. Posters do not require an accompanying written paper. However, authors who wish to have their work published in the proceedings can submit a written paper along with the poster. The Poster Session will be available for viewing every day in the main conference room and there will be a dedicated time slot on Sunday to showcase posters.

Organizer: Reuben Rohrschneider, Ball Aerospace & Technologies Corp, rrohrsch@ball.com,

Saturday, February 3, 2018

Morning: 7:00-10:30 AM Session I - "Student Innovations in GN&C"

THEME: This session embraces the wealth of GN&C focused innovative research projects occurring in the university setting. Papers in this session address hardware and 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 7 papers with the top 3 papers receiving monetary awards.

Organizers
David Chart, Lockheed Martin Space Systems, david.a.chart@lmco.com,
Ian Gravseth, Ball Aerospace & Technologies Corp., igravseth@ball.com

National Chairpersons
David Geller, Utah State University, david.geller@usu.edu
Lt. Col. Michael Sobers, USAF, michael.sobers@usafa.edu

Mid-Day 10:00 – 4:30 STEMScape

In 20182018, we will be again hosting our STEM event for one hundred high school students of diverse background from across the Denver metropolitan area. The event, called AAS STEM-SCAPE for "Student Career Arcs to Professional Engineers," will trace the elements of a successful career journey in aerospace including High School and University education, initial employment and ultimately a rewarding profession. Our keynote speaker is Lisa Hardaway, PH.D., Senior Program Manager in National Defense at Ball Aerospace & Technologies Corp., who will be followed by a STEM career panel. The event concludes with a short design project that will be co-led with student volunteers from the University of Colorado. If you are interested in volunteering at the event, please contact our STEMScape Organizers.

Organizers
Mike Drews, Lockheed Martin Space Systems, michael.e.drews@lmco.com
Meredith Stephens, Ball Aerospace & Technologies Corp, mlstephe@ball.com

Afternoon: 5:00-7:00 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
Jim Russell, Lockheed Martin Space Systems james.f.russell@lmco.com

Technical Session Topics

Scheduling for the technical sessions is still to be determined. These sessions will be scheduled between Sunday, February 4th at 7:00 AM, and Wednesday, February 7th at 10:00 AM. Papers are being solicited for the following sessions. Tutorial sessions will be scheduled from 10:30 AM – 1:30 PM between the technical sessions.

Advanced 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 matured by NASA, DOD, industry, and academia.

Organizers
John Abrams, Analytical Mechanics Associates, Inc., j.abrams@ama-inc.com
Christopher McLean, AU N-Leidos, christopher.mclean@lmco.com

National Chairpersons
Jeff Sheehy, NASA STMD, jeffrey.sheehy@nasa.gov

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
Davin Swanson, The Aerospace Corporation, davin.k.swanson@aero.org
Jim Chapel, Lockheed Martin Space Systems, jim.d.chapel@lmco.com

National Chairpersons
Steeve Kowaltschek, European Space Agency - Agence Spatiale Européenne, steeve.kowaltschek@esa.int
Scott Glubke, NASA Goddard Space Flight Center, scott.e.glubke@nasa.gov

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
Scott Piggott, University of Colorado, Scott.Piggott@lasp.colorado.edu
Tomas Ryan, Ball Aerospace & Technologies Corp, tomaskryan@gmail.com

National Chairpersons
Mark Jackson, Blue Origin, MJackson@blueorigin.com

Advances in RPOD

THEME: This session explores the state of the art technologies that enable rendezvous, proximity operations and docking with manmade or natural targets (cooperative or non-cooperative). Precise optical range sensors such as LIDARs that provide in-situ measurements coupled with modern algorithms are key to robust and optimal planning of autonomous operations.

Organizers
Larry Germann, Left Hand Design, germannl@lefthand.com
Jastesh Sud, Lockheed Martin Coherent Technologies, jastesh.sud@lmco.com

National Chairpersons
Miguel San Martin, NASA Jet Propulsion Laboratory, alejandro.m.sanmartin@jpl.nasa.gov
Al Bosse, Missle Defence Agency, albert.bosse.ctr@mda.mil
Dave Dannemiller, NASA JSC, EG6, David.P.Dannemiller@nasa.gov

Commercial Crew and Cargo GN&C

THEME:

Organizers
Greg Burgess, Sierra Nevada Corporation, Gregg.Burgess@SNCorp.com
David Shoemaker, Lockheed Martin Space Systems Company, david.m.shoemaker@lmco.com

Entry, Descent & Landing GN&C

THEME: Entry, descent, and landing technologies enable surface exploration of celestial bodies and safe return of payloads to Earth. Recent advances have improved landed mass capability at Mars and enabled the reuse of launch vehicle first stages. Ongoing work to further improve performance at government, industry, and university laboratories will enable more ambitious missions in the future. This session provides a venue for the discussion of advanced guidance and control technology for atmospheric entry vehicles as well as powered and unpowered descent and landing systems, including technologies for precision navigation and targeting, hazard avoidance, and safe landing.

Organizers
Reuben Rohrschneider, Ball Aerospace & Technologies Corp, rrohrsch@ball.com
Michael Osborne, Lockheed Martin Space Systems Company, michael.l.osborne@lmco.com

National Chairpersons
Zach Putnam, University of Illinois, zputnam@illinois.edu

GN&C Advances to Enable New Frontiers in Crewed Spaceflight

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. Many new approaches are already in the final stages of development on the Orion and Space Launch System (SLS) programs, and yet further advances will be necessary to take 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
Ellis King, Draper Laboratory, eking@draper.com
Jastesh Sud, Lockheed Martin SSC, jastesh.sud@lmco.com

National Chairpersons
Tim Straube, NASA-JSC, timothy.m.straube@nasa.gov
Mike Hawes, Lockheed Martin SSC, micheal.w.hawes@lmco.com

GN&C Challenges of Asteroid Deflection

THEME: In recent years, the detection of small bodies threatening the Earth and the characterization of asteroids for the purpose of resource utilization have received much attention. Threat mitigation efforts include actively perturbing the trajectory, while utilization efforts might include redirecting these small bodies to locations which facilitate access. The success of these endeavors depends directly on the ability to guide, navigate and control the robotic systems needed to meet that challenge. This session will highlight the Guidance, Navigation and Control challenges of deflecting and redirecting small bodies such as comets and asteroids.

Organizers
Daniel Kubitschek, Laboratory for Atmospheric and Space Physics, Daniel.Kubitschek@lasp.colorado.edu
Charlie Schira, Space Sciences & Engineering LLC, cschira@spacescieng.com

National Chairpersons:
Dr. Paul Chodas, NASA-JPL, paul.w.chodas@jpl.nasa.gov

GN&C Parts (sub components)

THEME:

Organizers
Kyle Miller, Ball Aerospace & Technologies Corp., kbmiller@ball.com, 303-533-4348
Shawn McQuerry, Lockheed Martin Coherent Technologies, shawn.c.mcquerry@lmco.com, 303-729-4425

GN&C Pioneers of the 21st Century

THEME: This session will offer reflections on the careers and contributions of scientists and engineers who pioneered notable technical solutions for our aerospace community.

Organizers
James McQuerry, Ball Aerospace & Technologies Corp (Retired), mcquerrydj@comcast.net
Neil Dennehy, NASA, Goddard Space Flight Center, cornelius.j.dennehy@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

Alex May, Lockheed Martin Space Systems Company, alexander.j.may@lmco.com
Brian Kirby, University of Colorado, brian.kirby@lasp.colorado.edu

National Chairpersons

Bill Frazier, NASA Jet Propulsion Laboratory, william.e.frazier@jpl.nasa.gov
Neil Dennehy, NASA Goddard Space Flight Center, cornelius.j.dennehy@nasa.gov

RoadMap (National Research Council) Panel GN&C Education Panel Professors and Industry Engineers

THEME:

Organizers

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Lee Barker, Lockheed Martin Space Systems, lee.a.barker@lmco.com

Science/Weather Enabled

THEME: This session looks at the scientific results that GN&C has helped deliver. From exoplanet detections to Martian habitability to studying on our own planet, G&C engineering has played a significant role in enabling some of the most exciting scientific discoveries of our generation. These findings not only add to the body of scientific knowledge of our world and worlds beyond, they light the public's imagination and inspire tomorrow's scientists and engineers.

Organizers

Heidi Hallowell, Ball Aerospace & Technologies Corp, hhallowe@ball.com
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National Chairpersons

Bill Frazier, NASA Jet Propulsion Laboratory, william.e.frazier@jpl.nasa.gov

Small Satellite GN&C

THEME: Cubesats and smallsats range in mass from less than 1kg up to 180kg, and are gaining in popularity and utility. At the high end of this mass range, 100 to 180kg ESPA-class spacecraft are now trusted platforms for scientific and defense missions and offer pointing accuracy, pointing stability, and position knowledge that is compatible with Earth science missions. For cubesats, the GN&C capabilities are advancing quickly in an effort to support science and technology development missions. Both classes are now pushing the envelope to provide features that were previously only available on much larger class satellites, such as autonomous RPO and docking as well as significant on-board mission data processing capabilities. This session is open to papers covering hardware, software, and lessons learned regarding smallsat and cubesat GN&C. Papers on technology development for GN&C and mission GN&C experience are welcomed.

Organizers

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Jeffrey Parker, Advanced Space, *parker@advanced-space.com*

National Chairpersons

Paul Mason, NASA Goddard Space Flight Center, *paul.a.mason@nasa.gov*
Scott Palo, University of Colorado, *scott.palo@colorado.edu*

Space Launch System (SLS) Navigation

THEME: NASA's Space Launch System (SLS) represents a new era in space exploration for the United States. With the ability to implement increasingly more powerful launch configurations for both crew and cargo, SLS will help transport human and robotic missions to the moon, Mars, and beyond. This session will explore the navigation solutions required for mission success of this next generation space vehicle and its missions.

Organizers
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John Reed, United Launch Alliance, john.g.reed@ulalaunch.com

National Chairpersons
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Ted Oliver, NASA MSFC, Ted.E.Oliver@nasa.gov

Note to Authors:

Abstracts are due by September 8th, 2017.

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