Intelligent Autonomy for Space and Unmanned Systems

Autonomous systems are increasingly being deployed in many unmanned, space, and robotic platforms. Systems with high-level autonomy capabilities can greatly improve efficiency and reduce costs associated with the design and operation of many aerospace systems.

Space exploration robotic systems are highly autonomous and are capable of high-level interactions with human operators to accomplish mission objectives. NASA’s Mars Exploration Rovers (MER) have demonstrated the benefits of autonomy and intelligent systems in space exploration using machine vision, hazard avoidance, onboard re-tasking, intelligent data processing, and many other computational processes. Higher performance embedded computing resources utilizing advanced multi-core or graphics processors provide the raw performance needed to realize these increases in autonomy and computations.

Spacecraft designs are increasingly developed to include new, advanced capabilities for autonomy such as automated rendezvous and docking, intelligent adaptive control, adaptive mission operations, integrated system health management, plug-and-play mechanisms, and other intelligent functions that enable complex operations to be performed in a space environment.

Unmanned Aircraft Systems (UAS) share many common autonomous capabilities with space systems by leveraging onboard computational resources to perform tasks such as intelligent terrain feature recognition and vision-based guidance. There are many significant technology and policy challenges to the integration of UAS into the National Airspace System (NAS) that are currently being addressed.

Ground-based unmanned systems have begun to appear and are being developed with autonomous guidance and navigation capabilities. These systems are capable of sensing and feature detection in terrain and urban settings, collision avoidance, and self-guidance and navigation.

The technologies that enable autonomy in unmanned and space systems are being developed at a rapid pace. They integrate many foundational disciplines to achieve integrated solutions that utilize new and existing capabilities in intelligent systems, integrated system health management, sensor systems, software and computers, communications, digital avionics, and information and command and control. Infotech@Aerospace 2012 will explore many of the core technologies and integration considerations that will enable “Intelligent Autonomy for Space and Unmanned Systems.”

Sincerely,

Nhan Nguyen
I@A 2012 General Chair
Infotech@Aerospace (I@A) is AIAA’s premier forum for modern aerospace applications focusing on information-enabled systems, algorithms, hardware, and software, and provides a unique opportunity for fostering advances and interactions across these disciplines. Attendees and authors span military, scientific, commercial, and academic communities that are driven by the communication of information via computers and software. These communities will shape the 21st century development of aerospace systems. I@A 2012 will cover scientific and engineering issues related to architecting, designing, developing, operating, and maintaining modern aerospace and defense systems: this includes aircraft, spacecraft, ground systems, robots, avionics, and sensors, as well as systems of systems. Of particular interest are autonomous, cooperative, space, and unmanned systems, communication and networked systems, robotic systems, and human-machine interactions. Select technical papers will be considered for publication in AIAA’s Journal of Aerospace Computing, Information, and Communication (JACIC).

Organizing Committee

General Chair
Nhan Nguyen
NASA Ames Research Center

Technical Program Chair
Timothy Howard
EOSESS LLC

Deputy Technical Program Chair
Fernando Figueroa
NASA Stennis Space Center

Technical Event Chairs
Brian Argrow
University of Colorado, Boulder
Mitch Ingham
Jet Propulsion Laboratory, California Institute of Technology

Marketing Chair
Susan Frost
NASA Ames Research Center
BENEFITS OF ATTENDANCE

WHY ATTEND?
Nowhere else will you get the depth and breadth of sessions offered at I@A. The conference will cover scientific and engineering issues related to architecting, designing, developing, operating, and maintaining modern aerospace and defense systems: this includes aircraft, spacecraft, ground systems, robots, avionics, and sensors, as well as systems of systems.

- Expand your knowledge, as expert engineers and scientists share their latest research and development findings.
- Discover what lies ahead, as senior leaders in industry discuss their programs and business challenges during plenary sessions and interactive panel discussions.
- Network, discuss challenges, and share ideas during technical sessions, luncheons, networking breaks, and social activities.

WHO SHOULD ATTEND?
- Engineering managers and industry executives
- Engineers, researchers, and scientists
- Young aerospace professionals
- Educators and students

WHAT TO EXPECT?
Discussion with distinguished speakers, including:

Tuesday Keynote
Robert Manning, Chief Engineer, Mars Science Laboratory
Jet Propulsion Laboratory, California Institute of Technology

UAS Plenary Panel Speaker
Brian Argrow, Director, Research and Engineering Center for Unmanned Vehicles, University of Colorado

Wednesday Keynote
Col Eric “Scam” Mathewson, U.S. Air Force (Ret.),
Director, UAS Strategy, The Boeing Company

Wednesday Awards Luncheon Keynote
Lt Gen Michael A. Hamel, U.S. Air Force (Ret.),
Senior Vice President of Corporate Strategy and Development, Orbital Sciences Corporation

Thursday Keynote
Steve Chien, Senior Research Scientist and Technical Group Supervisor of the Artificial Intelligence Group, Jet Propulsion Laboratory, California Institute of Technology
## EVENT AT A GLANCE

<table>
<thead>
<tr>
<th>Time</th>
<th>Monday 18 June 2012</th>
<th>Tuesday 19 June 2012</th>
<th>Wednesday 20 June 2012</th>
<th>Thursday 21 June 2012</th>
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<tbody>
<tr>
<td>0700 hrs</td>
<td>Speakers' Breakfast</td>
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<td>0800 hrs</td>
<td>Keynote</td>
<td>Keynote</td>
<td>Technical Sessions</td>
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<td>0900 hrs</td>
<td>Networking Break</td>
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<td>1000 hrs</td>
<td>UAS Plenary Panel</td>
<td>Technical Sessions</td>
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<tr>
<td>1100 hrs</td>
<td>Lunch on Your Own</td>
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<tr>
<td>1200 hrs</td>
<td>JPL Tour</td>
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<tr>
<td>1300 hrs</td>
<td>Technical Sessions</td>
<td>Solutions</td>
<td>Technical Sessions</td>
<td>Lunch on Your Own</td>
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<tr>
<td>1400 hrs</td>
<td>Networking Break</td>
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<td>1500 hrs</td>
<td>Technical Sessions</td>
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<td>1600 hrs</td>
<td>Technical Sessions</td>
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<tr>
<td>1700 hrs</td>
<td>Welcome Reception</td>
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<td>1800 hrs</td>
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<td>1900 hrs</td>
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**JPL Tour**

*Buses leave for JPL at 1200 hrs, and return at 1800 hrs. Actual tour time: 1330–1600 hrs*

Schedule subject to change.
### Registration Information

<table>
<thead>
<tr>
<th>Registration Type</th>
<th>Conference Rate</th>
<th>AIAA Member</th>
<th>Conference Sessions</th>
<th>Monday JPL Tour</th>
<th>Tuesday Reception</th>
<th>Wednesday Awards Luncheon</th>
<th>Online Proceedings</th>
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<tbody>
<tr>
<td>Option 1 Full Conference with Online Proceedings</td>
<td>$915</td>
<td>$760</td>
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<td>Option 2 Full-Time Undergraduate Student</td>
<td>$50</td>
<td>$20</td>
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<td>Option 3 Full-Time Undergraduate Student with Networking</td>
<td>$165</td>
<td>$135</td>
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<td>Option 4 Full-Time Graduate or Ph.D. Student</td>
<td>$90</td>
<td>$60</td>
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<td>Option 5 Full-Time Graduate or Ph.D. Student with Networking</td>
<td>$205</td>
<td>$175</td>
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<td>Option 6 Full-Time AIAA Retired Member</td>
<td>N/A</td>
<td>$40</td>
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<td>Option 7 Group Discount (per person)*</td>
<td>N/A</td>
<td>$680</td>
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**Extra Tickets**

- Tuesday Evening Reception: $60
- Wednesday Awards Luncheon: $55
- Online Proceedings: $170

Pricing subject to change.

*Advance only. 10% discount off early-bird member rate for 10 or more individuals from the same organization who register and pay at the same time with a single form of payment. Includes all catered events and online proceedings. A complete typed list of registrants, along with completed individual registration forms and a single payment, must be submitted by the preregistration deadline of 17 June 2012. No substitutions.

**Additional information on back cover.

All participants are urged to register on the AIAA website at [www.aiaa.org/I@A2012](http://www.aiaa.org/I@A2012). Registering in advance saves conference attendees time and up to $200. A check made payable to AIAA or credit card information must be included with your registration form. A PDF registration form is available on the AIAA website. Print, complete, and mail or fax with payment to AIAA. Address information is provided.

Early-bird registration forms must be received by 21 May 2012. Preregisters may pick up their materials at the advance registration desk. All those not registered by 17 June 2012 may do so at the on-site registration desk. All nonmember registration prices include a one-year AIAA membership. If you require more information, please call 703.264.7504 or email chrisb@aiaa.org.

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**Early Bird Registration Deadline**

21 May 2012
**Technical Areas of Focus**

Infotech@Aerospace covers a broad range of topics related to aerospace information systems, such as:

- Space Autonomous Systems and Robotics
- Unmanned Systems Applications
- Human-Machine Interface
- Intelligent Systems
- System Integrity, Verification, and Validation
- Adaptive Systems
- Sensor Systems
- Integrated System Health Management (ISHM)
- Data / Information Fusion
- Computer Systems
- Software Systems
- Plug-and-Play Mechanisms
- Real-Time Embedded Computing Technologies

**U.S. Technology Regulations**

U.S. nationals (U.S. citizens and permanent residents) are reminded that it is their responsibility to comply with ITAR and Technology Transfer restrictions. Visit www.aiaa.org for more details.

**Hotel Reservations**

AIAA has made arrangements for a block of rooms at the Hyatt Regency Orange County, 11999 Harbor Blvd., Garden Grove, CA 92840.

Room rates are $125 for single or double occupancy. These rooms will be held for AIAA until 21 May 2012 while availability lasts. After 21 May, any unused rooms will be released to the general public. You are encouraged to book your hotel room early.

**Conference Sponsorship Opportunities**

When your brand is on the line, AIAA sponsorship can raise the profile of your company and put you where you need to be. Available packages offer elevated visibility, effective marketing and branding options, and direct access to prominent decision makers from the aerospace community. Contact Cecilia Capece at ceciliac@aiaa.org or 703.264.2570 for more details.

**Wireless Internet Access**

Wireless Internet access will be provided in all meeting spaces from Tuesday, 19 June at 0600 hrs through Thursday, 21 June at 1800 hrs.
Monday, 18 June 2012
1330–1600 hrs *

**JPL Tour**

Pasadena is the home of the Jet Propulsion Laboratory, the lead U.S. center for robotic exploration of the solar system. The tour highlights include the JPL Visitor Center space museum, the Spacecraft Assembly Facility, where JPL's robotic spacecraft are integrated and tested, the Space Flight Operations Facility, which houses the mission control center for JPL's deep space missions, and other robotic testbeds and facilities used by JPL deep space and planetary missions.

This tour is free of charge with a capacity of 80 people. To sign up, simply click the JPL Tour box option when registering for the conference. To ensure your spot, sign up no later than 18 May. No substitutions.

*Bus transportation will leave the hotel lobby at approximately 1200 hrs and return at 1800 hrs.

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**Student Paper Competition**

The AIAA Intelligent Systems Technical Committee (ISTC) is hosting the 4th Intelligent Systems Student Paper Competition at I@A 2012, sponsored by Computer Sciences Corporation and the Intelligent Systems Technical Committee. Up to four finalists will present their papers during a special student paper competition session, from which the Best Paper/Presentation will be selected, with the winner receiving a $1,000 prize at the Awards Luncheon.

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**ISTC I@A 2012 Video Contest**

“What is an Intelligent System?”

In an effort to encourage critical thinking about the uses of Intelligent Systems for air and space applications, the ISTC is asking Middle School and High School students to create a short video that attempts to answer the question for themselves: “What is an Intelligent System?” Final judging is to be held at the I@A conference by conference attendees.