



33rd  
**DASC** 

Digital Avionics Systems Conference

## Designing an Air Transportation System with Multi-Level Resilience

Antlers Hilton, Colorado Springs, CO | October 5-9, 2014





## Welcome to the 33rd Digital Avionics Systems Conference



Welcome to Colorado Springs and the Rocky Mountains foothills of the State of Colorado. This is truly a beautiful part of the country and we're sure your stay will be enjoyable. We have a strong plenary session panel of speakers and other conference functions. We'll have the opportunity to learn and have fun. Nearby, we will attend the Pro-Rodeo Hall of Fame for our social event, and you can visit the Garden of the Gods Park, Pikes Peak, and mining 'ghost' towns. We'll continue the DASC tradition of highlighting the latest trends in digital avionics through technical presentations, professional education courses, and exhibits.

This year's theme is the design of air transportation systems that are resilient at different system levels. The presentations, posters, papers, and discussions that comprise this conference will build upon the theme of the 32nd DASC wherein the interplay between safety and system efficiency were explored. Participants will be challenged to show how their work helps to develop, promote, or enable resilience. Of particular interest will be perspectives that describe the use of policy and economics as tools for engineers to manage system and product life-cycle development, deployment, degradation, and decay. Talks of interest may focus on systems' failure modes, fault tree research, graceful degradation, defense-in-depth, and system alerts and recovery. An interesting assertion that should be addressed is whether designing a resilient system sub-component always contributes to an improvement in overall system resilience.

The 33rd DASC provides a 'big-tent' opportunity to learn and present research progress on onboard avionics and the infrastructures that provide air navigation services. Within these domains, our technical talk 'tracks' include topics of air traffic management; avionics; communications, navigation, surveillance systems; integrated modular avionics; systems engineering; unmanned aerial vehicles, emerging technologies, and software/verification and validation.

On behalf of the AIAA Digital Avionics Technical Committee and the IEEE Aerospace Electronics Systems Section, I thank you for participating in this year's DASC. Through your participation, you can help to influence the future directions of industry, government, and academia as we all work together to transform flight.

**Benjamin Levy**  
**33rd DASC General Chair**



## Welcome to Colorado Springs!



The Antlers Hilton Colorado Springs offers convenience to local attractions and spacious accommodations. Since the original Antlers opened its doors in 1873, the name has remained inseparable with the city of Colorado Springs. Located in the historically significant and trendy area of downtown Colorado Springs, the Antlers Hilton hotel is just 11 miles from the Colorado Springs Municipal airport (COS). Walk just one block to reach the major downtown area of Tejon Street. Known for its majestic scenery and temperate climate, Colorado Springs is an ideal location for business travelers and leisure guests.

Relax with a pint of home-brewed beer or ale in cozy Judge Baldwin's, also serving a wide selection of lunch and dinner dishes. Antlers Grille serves contemporary American cuisine in a traditionally elegant setting. Sip a gourmet coffee at Mocha Bean café or enjoy a glass of wine at the Lobby Bar. Enjoy stunning views of the Rocky Mountains at their best from the complimentary indoor swimming pool and fitness center. We are located minutes from many hiking, cycling, and other outdoor venues.

### Parking

The parking garage offers self-parking at \$17.00 or valet parking at \$22.00.

### Breaks/Refreshments

Coffee, tea, water, and soft drinks will be available each day, complimentary to registered attendees.

### Speakers Breakfast

On Tuesday, Wednesday, and Thursday, breakfast will be held from 7:00-8:00 a.m. for speakers who are scheduled to present in a technical or plenary session that day. Speakers are required to attend this breakfast to prepare for their session with their session chair.

### Special Event (Thursday, 6:00 – 10:00 p.m.)

To savor the atmosphere of the West, join us Thursday evening at the **ProRodeo Hall of Fame and Museum of the American Cowboy**. Learn about the history of rodeo by exploring the museum's exhibits of historical artifacts and watching a short movie, enjoy strolling the beautiful gardens with a stunning backdrop of Pike's Peak, or purchase a memento from the gift shop. The Gold Canyon Gunfighters will entertain us by depicting the ruthless life of the frontier.

The museum was opened in August 1979 as an educational and entertaining forum designed to preserve the legacy of the cowboy contests, the heritage and culture of those original competitions, and the rodeo champions of the past, present, and future.

Dinner will be an Old West Chuck Wagon buffet beginning at 7:30, with barbecued beef and pork. For a vegetarian dinner, make a request on the Special Event sign-up sheet at the DASC Registration Desk when you pick up your ticket.

Buses will depart the hotel at 5:30 and 6:00. The gift shop will be open until 7:00. Buses will depart the museum at 10:00. Be sure to sign up at the Registration Desk to obtain your ticket for this exciting evening.



## 33rd DASC Week at a Glance

Sunday 10/5/14	Monday 10/6/14	Tuesday 10/7/14	Wednesday 10/8/14	Thursday 10/9/14
9:30 - 5:00 Registration Open	7:30 - 5:00 Registration Open	7:30 - 5:00 Registration Open	7:30 - 5:00 Registration Open	7:30 - 4:30 Registration Open
9:30 - 11:30 Register for Tutorials	8:00 - 11:00 Tutorials Session MM	8:30 - 11:30 Plenary Session	8:00 - 11:30 Technical Session B	8:00 - 11:30 Technical Session D
11:30 - 2:30 Tutorials Session SL (Lunch Provided)	11:30 - 2:30 Tutorials Session ML (Lunch Provided)	9:50 - 10:05 Break	9:30 - 10:00 Break	9:30 - 10:00 Break
		Exhibits Open 11:30 - 4:30	Exhibits Open 9:00 - noon	
		11:30 - 1:30 Lunch in Exhibit Hall	11:30 - 1:30 Awards Luncheon	11:30 - 1:30 Luncheon Presentation
2:30 - 3:00 Break	2:30 - 3:00 Break			
		1:30 - 5:00 Technical Session A	1:30 - 5:00 Technical Session C	1:30 - 5:00 Technical Session E
3:00 - 6:00 Tutorials Session SA	3:00 - 6:00 Tutorials Session MA	3:00 - 3:30 Break	3:00 - 3:30 Break	3:00 - 3:30 Break
Open Evening	6:00 - 8:00 Exhibits Open  Social Event in Exhibit Hall	5:30 - 7:00 Exhibits Open  Reception in Exhibit Hall	Open Evening	6:00 - 10:00 ProRodeo Hall of Fame and Museum of the American Cowboy

The organizers of DASC ask that you respect the privacy of our presenters. While video recordings or other media captures of presentation content are forbidden, Session Chairs and Presenters may authorize it. Re-sale or posting of this media for public use is also forbidden without express prior AIAA/IEEE approval. Material approved for release will be made available in the conference proceedings, Internet, and social media, as appropriate.

## Awards Luncheon

Wednesday, 11:30 a.m. - 1:30 p.m.

Each year, significant accomplishments of certain individuals in the field of digital avionics are recognized. At this year's conference, we will be presenting the Distinguished Institution Award, the David Lubkowski Memorial for Advancement in Digital Avionics Best Paper Award for the 32nd DASC, 33rd Best of Track, and Student Best Paper Awards.

### Avionics Distinguished Institution Award

The Avionics Distinguished Institution Award is an annual award conferred by the AIAA's Digital Avionics Technical Committee and presented at the Digital Avionics Systems Conference. The award is given to an Institution in recognition of outstanding achievements and invaluable contributions to developing and transforming critical technologies that address national priorities through research, technology and systems integration. The recipient can be an academic institute, a government facility of an industry corporation. The award recipient is also recognized for their generous volunteer support to the success of the AIAA Digital Avionics Technical Committee, the Digital Avionics Systems Conference (DASC), and the Integrated Communications Navigation and Surveillance Conference (ICNS). The 2014 Award Winner is Saab Sensis.

### David Lubkowski Memorial for Advancement in Digital Avionics Best Paper Award

A committee of several DATC members selects the David Lubkowski Memorial for Advancement in Digital Avionics Best Paper Award of the 32nd DASC based on technical content, application to the real world, and effective presentation. The award is sponsored by MITRE/CAASD and will be presented by MITRE/CAASD to "Airspeed Estimation Using Servo Current and Aircraft Model," Suvo Ganguli, Honeywell, Golden Valley, MN.





## Luncheon Presentation

Thursday, 11:30 - 1:30

### Resilience in Navigation Systems – A Pilot's View



**Albert (Al) Herndon** is a Principal Multi-Discipline Engineer at The MITRE Corporation's Center for Advanced Aviation System Development on the PBN Operations Team. He has worked on RNAV and RNP procedure development and implementation, aircraft avionics navigation capability and flight management systems differences both domestically and internationally for over 13 years.

Al is a retired Naval Aviator, flew for Pan American World Airways, and is a retired Trans World Airlines Captain.

34th  
DASC

Digital Avionics Systems Conference

## How are Global Airspace and Equipage Mandate Challenges Being Addressed by Avionics Research & Development?

13 - 15 September 2015  
Corinthia Hotel  
Prague, Czech Republic  
[www.dasconline.org](http://www.dasconline.org)

**General Chair:**  
Denise Ponchak

**Technical Program Chairs:**  
Erik Blasch  
Erik Theunissen



## Plenary Session

Tuesday 8:30 - 11:30 a.m.



**Richard Golaszewski**  
(Moderator)

Executive Vice President,  
GRA, Inc.

Richard Golaszewski is an Executive Vice President of GRA, Incorporated, and has over thirty-five years of experience in applying economic, financial, and statistical analysis to the air transportation industry for both private and public sector clients. He has completed a number of airline, air traffic management, and airport-related projects and has advised clients on new technology in aviation and its impact on the system. Mr. Golaszewski also speaks frequently on the financing of aviation infrastructure and has provided expert testimony on airport matters, airline mergers, and aviation safety.

Recent projects include advisor to the NASA-FAA Joint Planning and Development Office in economics, policy, and benefit cost analysis; analysis of incentive programs for avionics equipment; and examination of options to utilize reduced aircraft MTOW for fuel use reduction.

Mr. Golaszewski received a B.S. in Accounting (magna cum laude) from LaSalle College and an M.P.A. in Public Sector Management and Finance from the Wharton Graduate School, University of Pennsylvania. He was a military officer and helicopter pilot from 1967 to 1972.



**Roger D. Connor**

Curator, Aeronautics  
Department,  
Smithsonian Institution

Roger Connor began his aeronautical career as fixed-wing flight instructor and a designated examiner for the UK CAA, with nearly 4,000 hours of dual instruction given. He began working for the National Air and Space

Museum in 2000, where he curates the vertical flight (helicopters, gyroplanes, and VTOL aircraft), instrument and avionics, radar, air traffic control, gun sights and bombsights, and navigational infrastructure. He is co-curating a major new permanent exhibition on the history of navigation. Roger holds a Masters in Museum Studies from The George Washington University and a Masters in History from George Mason University, where he is now currently completing his Ph.D.



**Wayne Eastus**

Manager of the United  
Airlines Ramp Tower, IAH  
Airport

Wayne Eastus is the manager of the United Airlines company ramp tower at IAH Airport, since 1997. He is responsible for managing a staff of 12 controllers and three shift managers. Additionally he serves as United's liaison to the three local ATC facilities. Prior to 1997, Mr. Eastus worked for the City of Houston/ Airport Operations at IAH Airport for 13 years. He holds a B.S. degree in Geography from Sam Houston State University. His professional interests include use of airport automation technology to improve airport station operational efficiency, optimization of airport surface movement, and tactical solutions to surface challenges of extended taxi times (long tarmac delays, FAR 117, etc.).



**Gary Lohr**

Senior Research Scientist  
National Aeronautics and  
Space Administration

Gary Lohr is a senior research scientist with the National Aeronautics and Space Administration, working at the NASA's Langley Research Center. Mr. Lohr began his professional career as an air traffic controller with the United States Navy. During his active duty

and reserve career with the Navy, he was certified as an air traffic control tower operator, carrier air traffic controller as well as tactical air traffic controller. Duty with the Navy also included conducting safety assessments of Navy and Marine Corps air traffic control facilities throughout the United States. Following active duty, Mr. Lohr served as a tower and approach controller for the Federal Aviation Administration for four years.

During his tenure with NASA, he has been involved in over 40 research activities addressing capacity and efficiency improvements for the National Airspace System including: data link communications, parallel runway operations, wake vortex research, flight deck managed spacing, display aids for air traffic controllers, among others. Addressing both the airborne as well as the groundside components of the NAS, he has led the conduct of fast-time analysis, human-in-the-loop experiments as well as flight tests. He has served on several RTCA committees and currently serves on the Airspace & Airfield Capacity & Delay Committee for the Research Transportation Board and has authored or co-authored numerous technical publications. Mr. Lohr currently is the technical lead for NASA's work addressing efficient runway management.



**Laurence Mutuel**

Senior Principal Engineer,  
Software and Digital Systems  
CGH Technologies, Inc.

Laurence H. Mutuel has over 18 years of experience in avionics for both defense and civil aviation. She currently serves as principal engineer for FAA's Software and Digital Systems program addressing various issues in certification of software and complex electronic hardware, and cybersecurity. She's also a system architect for CGH Technologies on the NextGen's NAV Lean program to upgrade FAA's access and distribution of Aeronautical Information. In her previous role, she informed Thales Avionics Inc. on various NextGen programs, including datacomm and UAS integration into the NAS and advocated for harmonization and interoperability between SESAR and NextGen programs. Dr. Mutuel is an active



contributor to several standards with RTCA, SAE, and AEEC.

She earned a M.S. and a Ph.D. in aerospace engineering from the University of California at Los Angeles in 1996 and 2000, respectively, for her works on UAS fault-tolerant mission systems.



#### **Robert Pearce**

Director for Strategy,  
Architecture and Analysis,  
NASA

Robert Pearce is director for strategy, architecture and analysis in the Aeronautics Research Mission Directorate at NASA Headquarters. He is responsible for establishing a strategic systems analysis capability focused on understanding the system-level impacts of NASA's programs, the potential for integrated solutions, and the development of high-leverage options for new investment and partnership.

From 2003 until July 2010, Mr. Pearce was the deputy director of the FAA-led Next Generation Air Transportation System (NextGen) Joint Planning and Development Office (JPDO). The JPDO is an interagency office tasked with developing and facilitating the implementation of a national plan to transform the air transportation system to meet the long-term transportation needs of the nation.

Prior to the JPDO, Mr. Pearce held various strategic and program management positions within NASA. In the mid-1990s he led the development of key national policy documents including the National Science and Technology Council's "Goals for a National Partnership in Aeronautics Research and Technology" and the "Transportation Science and Technology Strategy." These two documents provided a substantial basis for NASA's expanded investment in aviation safety and airspace systems.

He began his career as a design engineer at the Grumman Corporation, working on such projects as the Navy's F-14 Tomcat

fighter and DARPA's X-29 Forward Swept Wing Demonstrator. Mr. Pearce also has experience from the Department of Transportation's Volpe National Transportation Systems Center where he made contributions in the area of advanced concepts for intercity transportation systems.

Mr. Pearce has received NASA's Exceptional Service Medal for sustained excellence in planning and advocating innovative aeronautics programs in conjunction with the White House and other federal agencies. He received NASA's Exceptional Achievement Medal for outstanding leadership of the JPDO in support of the transformation of the nation's air transportation system. Mr. Pearce has also received NASA's Cooperative External Achievement Award and several Exceptional Performance and Group Achievement Awards.

He earned a bachelor's of science degree in mechanical and aerospace engineering from Syracuse University, and a master's of science degree in technology and policy from the Massachusetts Institute of Technology.



#### **Lance Sherry**

Associate Professor of Systems  
Engineering and Operations  
George Mason University

Lance Sherry is Associate Professor of Systems Engineering and Operations Research at George Mason University. Dr. Sherry also serves as the Director of the Center for Air Transportation Systems Research at George Mason University. Dr. Sherry has over 30 years of experience in the aviation industry serving as a flight-test engineer, flight control engineer, system engineer, lead system architect, program manager, strategic planning and business development. Dr. Sherry served as a fellow at RAND Corporation 1999-2001. He has published over 100 papers and journal articles, holds several patents, and has received awards for his work. Dr. Sherry is a graduate of Brown University with B.Sc. in Electrical Engineering, and M.Sc., and Ph.D. in Industrial and System Engineering from Arizona State University.

## Conference Committee

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# Cary R. Spitzer Professional Education Program



**Professional Education Chair**

Maarten Uijt de Haag  
Ohio University

It is my pleasure to welcome you to the Cary R. Spitzer Professional Educational Program for the 33rd DASC named in memory of Cary R. Spitzer, long-time tutorial instructor for our digital avionics short courses. We are pleased to offer educational opportunities that are tailored to support this year’s theme: Designing an Air Transportation System with Multi-Level Resilience.

This year, we are offering 20 separate tutorials including 10 new or updated ones. All tutorials are organized into tracks to allow attendees to easily identify those educational opportunities that align most closely with their areas of interest. Most courses have been selected to directly complement the topics that will be presented in the technical program, from Avionics Design, Design Assurance, Systems Engineering and Communication Systems to Spacecraft Avionics, AIS/MET, UAS and

NextGen concepts. Some of these short courses directly address the theme of the conference relating the design of an air transportation system with multi-level resilience in the various digital avionics system disciplines.

All DASC tutorials will provide a real-time interactive discussion with the presenters, and have well-defined learning objectives and learning outcomes to help focus the course on the needs of attendees. DASC tutorials are affordable and offer an excellent opportunity to learn directly from experts in the field. Again this year, we are offering Continuing Education Units (CEU) for all courses. In short, no matter what your educational goals are, the professional development program of the 33rd DASC is sure to provide a valuable learning experience.

We hope you will take full advantage of the educational program and will benefit both technically and professionally from your participation in the 33rd DASC.

	Sunday, October 5		Monday, October 6			
Sunday's Session	11:30 - 2:30	3:00 - 6:00	8:00 - 11:00	11:30 - 2:30	3:00 - 6:00	Monday's Session
Systems Engineering <b>Freemont</b>		Fundamentals of Model-Based Systems Engineering (MBSE)	Air Traffic Control; How Does it REALLY Work?	Aircraft Systems, Safety and Cyber-security: RTCA DO-326A Guidance	Performance-Based Navigation	ATC, PBN and System Safety and Security <b>Freemont</b>
Instructor		SA1: Logan	MM1: Alvania	ML1: Fabre, Joyce	MA1: Helfrick	Instructor
UAS and Surveillance <b>Carson</b>	GNSS and Inertial for Unmanned Aerial Systems	Surveillance and Collision Avoidance for NextGen	Multicore in Avionics – Current Practices, Trends and Outlook for Certification	Exploring Multicore in an ARINC 653 Environment – A Hands-on Tutorial	DO-254 - Complex Electronic Hardware – Lessons from the Trenches	Hardware Design and Design Assurance <b>Carson</b>
Instructor	SL2: Uijt de Haag, Farrell	SA2: Duan, Farrell	MM2: Kinnan	ML2: Kinnan	MA2: Ferrell	Instructor
Spacecraft Avionics <b>Heritage A</b>	Part I – Spacecraft Avionics Systems Engineering Fundamentals	Part II – Spacecraft Avionics Subsystem Systems Engineering	Synthetic and Enhanced Vision Systems	Digital Avionics	Modern Avionics Architectures	Avionics Systems and Architectures <b>Heritage A</b>
Instructor	SL3: Andrew	SA3: Andrew	MM3: Theunnissen, Uijt de Haag	ML3: Helfrick	MA3: Logan	Instructor
AIS, MET and Sensor Fusion <b>Heritage B</b>	AIS/MET Data Link Services	Overview of Information Fusion Theory, Models, and Representations	Software Design Assurance: DO-178B/C & DO-278/A	DO-178C - Tool Qualification and the Technical Supplements	Formal Methods in RTCA DO-178C	Design Assurance <b>Heritage B</b>
Instructor	SL4: Evans	SA4: Blasch	MM4: Ferrell	ML4: Ferrell, Ferrell	MA4: Joyce	Instructor
				Advanced System Integration: Ethernet Networking for Critical Embedded Systems		Communications <b>Heritage E</b>
Instructor				ML5: Steiner, Jakovljevi		Instructor

## Tutorial Descriptions

### Sunday, October 5th

#### Session 1 – Systems Engineering

##### **SA1: Fundamentals of Model-Based Systems Engineering (MBSE)**

Glen T. Logan, LRDC Systems LLC

This tutorial will provide an overview of MBSE fundamentals and associated tools, describe their use and utility in supporting systems engineering needs, and provide a summary of successful use of MBSE in delivering capabilities to the Department of Defense (DoD).

The MBSE approach for developing architecture is based on Systems Engineering (SE) principles—the formalized application of modeling to support system requirements, design, analysis, verification and validation activities beginning in the conceptual design phase and continuing throughout development and later life cycle phases.

The tutorial will present proven MBSE benefits through a series of example applications including:

- Improved Quality
- Increased productivity
- Reduced Risk.

### Sunday, October 5th

#### Session 2 – UAS and Surveillance

##### **SL2: GNSS and Inertial for Unmanned Aerial Systems**

Maarten Uijt de Haag, Ohio University  
James L. Farrell, Vigil Inc.

Global Navigation Satellite Systems (GNSS) such as the Global Positioning System (GPS) are being used in a wide variety of applications in today's society and are already an enabling function on many Unmanned Aerial Systems (UAS). This course will first introduce the various UAS application domains and operational environments. Then, this tutorial will describe the basic operation of GPS and other GNSSs, their error sources and modes of operation, and the state of art in GPS technology. Next, we will discuss the UAS-

specific applications of GNSS for the various operational environments and applications including standalone GNSS, differential and relative GNSS, and the use of GNSS in precise surveillance. Finally, augmentation methods will be addressed with a focus on inertial measurements (IMUs) to enable a guaranteed required navigation performance in, especially, GNSS-challenged environments.

##### **SA2: Surveillance and Collision Avoidance for NextGen**

Pengfei "Phil" Duan, Ohio University  
James L. Farrell, Vigil Inc.

This short course will discuss current and planned surveillance systems for the Next Generation Air Transportation System (NextGen) and Europe's Single European Sky Air Traffic Management Research (SESAR), and methods to assure aircraft separation and avoid midair collisions. Surveillance systems will play an important role in detecting, validating, and characterizing cooperative and non-cooperative air vehicles in and approaching the National Airspace System (NAS). This course will discuss independent non-cooperative (i.e., primary surveillance radar), independent cooperative (i.e., secondary surveillance radar and multi-lateration) and dependent cooperative systems such as ADS-B and TIS-B. Much focus will be placed on the role of the latter systems in Aircraft Surveillance Application Systems (ASAS) such as conflict detection and enhanced visual acquisition as described in, for example, DO-317. Furthermore, this course will address aircraft collision avoidance systems (ACAS) such as the Traffic Alert and Collision Avoidance System (TCAS) II and discuss the future use of improved surveillance through ADS-B for ACAS.

### Sunday, October 5th

#### Session 3 – Spacecraft Avionics

##### **SL3: Part I – Spacecraft Avionics Systems Engineering Fundamentals**

George Andrew, GNA Aerospace Consulting Group, Inc.

This session pertains to the full life cycle of the systems engineering of the avionics system. Covered will be: the requirements at the mission level and derived requirements at the subsystem level; trade studies; configuration management; documentation, risk management; safety; schedule; and cost. Managers, systems engineers, or details designers interested in learning more about the avionics systems engineering process should register for this tutorial. Combined with Part II – Spacecraft Avionics Subsystem System Engineering, the participant will attain a greater level of depth and understanding of how the systems engineering process is so vital and important to the success of any spacecraft avionics program or project.

##### **SA3: Part II – Spacecraft Avionics Subsystem Systems Engineering**

George Andrew, GNA Aerospace Consulting Group, Inc.

This session provides a detailed look at basic spacecraft subsystem avionics systems level design and engineering requirements required to develop the Avionics System and Subsystem Level Architecture. The session will detail how to derive Avionics System Level requirements from higher Mission Level Requirements and documentation required to conceptualize and develop Avionics Subsystem Architectures. Combined with Part I – Spacecraft Avionics Systems Engineering Fundamentals, the participant will attain a greater level of depth and understanding of how the Avionics Subsystem Systems Engineering process is so vital and important to the success of any spacecraft avionics program or project.



# Tutorial Descriptions

## Sunday, October 5th

### Session 4 – AIS, MET and Sensor Fusion

#### SL4: AIS/MET Data Link Services

Tom Evans, NASA Langley Research Center

This tutorial provides a look at standards for Aeronautical Information Services (AIS) and Meteorological (MET) Data Link Services developed by RTCA Special Committee 206. These services are envisaged to be implemented within the next decade as communication with aircraft moves increasingly from voice to data link. SC-206 was established in 2005 at the request of the FAA to develop standards for data link as the normal means of cockpit receipt of information. SC-206 documents to be discussed include:

- DO-308 Operational Services and Environment Definition for AIS and MET Data Link Services (Dec 2007)
- DO-324 Safety and Performance Requirements for AIS and MET Data Link Services (Dec 2010)
- DO-340 Concept of Use for AIS and MET Data Link Services (Sept 2012)
- DO-xxx AIS and MET Delivery Architecture Recommendations (draft, Dec 2013)
- DO-xxx Minimum Aviation Safety Performance Standards for Providing AIS and MET Data Link Services for Decision Support (draft, Dec 2014).

#### SA4: Overview of Information Fusion Theory, Models, and Representations

Erik P. Blasch, AFRL Information Directorate

Over the past decade, the information fusion community has put together special sessions, panel discussions, and concept papers to capture the methodologies, directions, needs, and grand challenges for practical system designs. This tutorial brings together the contemporary concepts, models, and definitions to give the attendee a summary of the state-of-the-art in information fusion systems designs that emphasizes examples in aviation. Analogies from low-level information fusion (LLIF) of object tracking (e.g., navigation) are extended to the high-level information fusion (HLIF) concepts of situation/impact assessment

and process/user refinement. HLIF theories (operational, functional, formal, cognitive) are mapped to representations (semantics, ontologies, axiomatics, and agents) with contemporary issues of modeling, testbeds, evaluation, and human-machine interfaces. Discussions with examples of search and rescue, cyber analysis, and airport efficiency are presented. The attendee will gain an appreciation of HLIF through the topic organization from the perspectives of numerous authors, practitioners, and developers of information fusion systems. The tutorial is organized as per the recent text: E. P. Blasch, E. Bosse, and D. A. Lambert, High-Level Information Fusion Management and Systems Design, Artech House, April 2012, of (1) HLIF theories, (2) HLIF representations in information fusion testbeds, and (3) HLIF supporting elements of human-system interaction, scenario-based design, and HLIF evaluation.

## Monday, October 6th

### Session 1 – ATC, PBN and System Safety and Security

#### MM1: Air Traffic Control; How Does it REALLY Work?

Stephen Alvania, Air Traffic Systems Consulting, LLC

The real question should be “ATC is so easy; why is it so hard to integrate new technology into the system?” First, the good news: The operational concept underlying air traffic control is simple and can usually be fully understood by almost anyone following a five-minute tutorial. The bad news: ATC is like an iceberg in that the complexity and beauty of the system exists beneath the water line where it is not easily observable or understood. That is the part where most people “don’t know what they don’t know.” As aviation professionals developing leading edge technologies and capabilities, it is essential to have a comprehensive appreciation of the messy, yet elegant, “real world” operational environment into which those new technologies must fit.

This tutorial on the U.S. Air Traffic Control (ATC) System is not about how to manage traffic at KXYZ airport. It’s about the operational commonalities and constraints that exist at all ATC facilities that must be dealt with by air traffic controllers every day and everywhere. The tutorial starts with discussions of fundamental ATC operational concepts, procedures, airspace structures and designs, as well as basic ATC principles. Following that, the discussion will center on ATC operations at airport traffic control towers (ATCTs), Terminal Radar Approach Controls (TRACONS), air route traffic control centers (ARTCCs), and the ATC System Command Center (ATCSCC). Each facility type will be examined for their control positions and associated operational responsibilities, control techniques and procedures, and inter/intra facility coordination. Finally, to the degree possible, videos and simple “game level” simulations will be run to give attendees a sense of what it “feels like” to be an air traffic controller.

#### ML1: Aircraft Systems, Safety and Cybersecurity: RTCA DO-326A Guidance

Laurent Fabre, Critical Systems Labs

Jeff Joyce, Critical Systems Labs

The increasingly integrated nature of electronic systems and network-intensive technologies in airborne systems, and the connection of these systems with ground-based systems, demands the use of effective processes to ensure that the assessment of airworthiness hazards takes sufficient account of information security threats. RTCA DO-326A, Airworthiness Security Process Specification, augments previously existing guidance for aircraft certification to handle the information security threat to aircraft safety.

The recent publication of RTCA DO-326A / EUROCAE ED-202A will have a substantial influence on aircraft system development with direct references to this standard by many aviation certification authorities including the FAA and EASA.

In this context this tutorial will review the concepts and process described in RTCA DO-326A

## Tutorial Descriptions

as well as highlight the main changes from DO-326 to DO-326A. As a member of the editorial group that developed the 326A version, the tutorial presenter will share insights on particular concepts such as security effectiveness and some of the approaches to be compliant with the standard.

Additionally this tutorial explains how to position and integrate the guidance from this standard versus other key and well-established standards related to system safety assessment and the development of aircraft systems respectively SAE ARP 4761 and SAE ARP 4754. To complete this introduction to upcoming changes related to aircraft cyber-security standard, this tutorial presents the scope of two other cyber-security related standards developed by the Special Committee-216. The titles of these two other standards are:

- Information Security Guidance for Continuing Airworthiness (recently released as RTCA DO-355)
- Airworthiness Security Methods and Considerations (Publication expected in the fall 2014)

In general, this tutorial will benefit all aircraft system engineers and engineering managers who want to gain insights about new expectations from aircraft certification authorities in the domain of cyber-security. Additionally this tutorial will be of most benefit to avionics designers, system safety engineers and security engineers who want to learn how the security process described in this new guidance document interacts with the disciplines of safety assessment and aircraft design.

### **MA1: Performance-based Navigation** [Albert B. Helfrick, Embry-Riddle](#)

The course introduces the implications of increased air traffic and the need for greater efficiency and safety for the future Nextgen environment. The course will investigate the move away from airways and introduction of area navigation, RNAV and the need for new paradigms in assessing system performance.

The navigation sensors and methods of path definition, including data bases will be discussed. Closing the loop and methods monitoring performance will be covered.

### **Monday, October 6th**

#### **Session 2 – Hardware Design and Design Assurance**

##### **MM2: Multicore in Avionics – Current Practices, Trends and Outlook for Certification**

[Larry Kinnan, Wind River](#)

Use of multicore in avionics is the next leap forward for small to large platforms in the industry. This tutorial will explore this trend in the industry, the current state-of-the-art, and the different approaches that can be used leading to eventual certification of these platforms.

##### **ML2: Exploring Multicore in an ARINC 653 Environment – A Hands-on Tutorial**

[Larry Kinnan, Wind River](#)

Through the use of Wind River's leading simulation product, the student will be able to build and execute ARINC 653 applications in a multicore environment. A guided tutorial will be used to help the student understand the multicore environment and its implications.

##### **MA2: DO-254 – Complex Electronic Hardware – Lessons from the Trenches**

[Tom Ferrell, Ferrell and Associates Consulting](#)

RTCA DO-254/ED-80 (Design Assurance Guidance for Airborne Electronic Hardware) was released in April 2000 and has steadily gained ground, now being applied throughout the civilian and military avionics industries. This tutorial, updated with the latest guidance from both the FAA and EASA on DO-254/ED-80's application will provide a comprehensive introduction to DO-254/ED-80. Topics covered will include the simple vs. complex dilemma, scope of application (device vs. higher levels of integration), granularity and format of hardware requirements, dealing with Commercial-Off-the-Shelf components, as well as Commercial Intellectual Property (COTS IP), and finding the right balance between differ-

ent types of verification (simulation, in-circuit directed testing, and the emerging area of constrained random testing). Challenges associated with showing and finding compliance to DO-254 will also be discussed, most notably the issues raised in CAST Paper 31. Finally, the tutorial will conclude with a discussion of possible futures for hardware design assurance. Even if you have some familiarity with DO-254, this session will help reinforce and deepen your understanding of its content and intent.

### **Monday, October 6th**

#### **Session 3 – Avionics Systems and Architectures**

##### **MM3: Synthetic and Enhanced Vision Systems**

[Erik Theunissen, Delft University of Technology](#)  
[Maarten Uijt de Haag, Ohio University](#)

Synthetic vision is regarded as a means to increase both safety and operational capabilities. The design of a synthetic vision system presents the designer with questions regarding which data needs to be presented; how the data should be represented; and how the representation should be mapped onto the display.

To provide an understanding of the design options and constraints for SVS/EVS-type displays, the tutorial will address the representation of terrain and trajectory data and non-physical constraints. Topics covered comprise the selection of the projection method, viewpoint, viewing direction, field of view (FOV), the use of color coding and textures to control visual fidelity and spatial frequency, the use of specific object shapes to provide temporal range information and exploit specific emergent features and concepts for display augmentation to enable a range of control strategies.

Next, display generation, graphics processors, 3-D engines and topics such as anti-aliasing and texturing will be covered to provide a better insight in the EVS/SVS technology enablers and constraints. Regarding SVS software, APIs

## Tutorial Descriptions

and rapid prototyping tools will be addressed.

Finally, this course will address methods to guarantee the quality or required performance (i.e., accuracy, integrity, availability and continuity) of the data represented on the SVS and EVS displays. Topics will include terrain database quality standards and integrity monitors and traffic tracking algorithms with built-in integrity monitors.

### ML3: Digital Avionics

Albert B. Helfrick, Embry-Riddle

This tutorial is an updated version of Cary Spitzer's long-running course of the same name. The tutorial is an overview of modern digital avionics systems with special emphasis on system architecture, environment, interconnects and intercommunications. Regulatory and international standards-setting organizations are introduced and their role in modern avionics design.

Safety analysis as a part of the design process is covered with examples of hardware, software and system safety assessment processes and the standards that govern them including DO-178 and DO-254. The role of safety assessment in the aircraft certification process is presented.

Human factors involving crew interfaces including displays, controls, and automation are discussed as well as the strengths and weaknesses of human vs. automation, citing examples of aircraft accidents.

Avionics environments both civilian according to RTCA DO-160 and the military standard MIL-810 are reviewed.

In addition to the usual temperature, pressure, vibration, shock, etc., some of the more demanding and important environmental factors, particularly for digital systems subject to upset, such as high intensity radiated fields, HIRF, and direct and indirect effects of lightning are covered.

### MA3: Modern Avionics Architectures

Glen Logan, LRDC Systems LLC

This tutorial is an updated version of Cary Spitzer's long-running course of the same name. Architectures from various civil and military aircraft are examined with comparisons of hardware and avionics functions of each discussed in detail. The tutorial presents key architecture and design challenges for legacy as well as new aircraft. These architectures have been carefully chosen to cover the following:

- Broad spectrum of aircraft types
- Federated and integrated designs
- Line Replaceable Unit (LRU) vis-à-vis modular packaging
- Impact of the Modular Open Systems Approach (MOSA) on architecture
- Range of non-essential to flight critical applications.

## Monday, October 6th

### Session 4 – Design Assurance

#### MM4: Software Design Assurance:

##### DO-178B/C & DO-278/A

Uma Ferrell, Ferrell and Associates Consulting

DO-178B/ED-12B served as the basic tool for accomplishing software design assurance for the civil aerospace industry for over twenty years. With a newly updated core, its successor, DO-178C/ED-12C, should continue to be THE standard for airborne software design assurance for many years to come. This tutorial is intended to serve as an introduction to this venerable set of objectives and activities required for all civil airborne software projects, as well as an increasing number of military efforts. In addition, this tutorial will familiarize the student with DO-278A, which extends and clarifies DO-178 content for the ground and space-based community. Starting with the broader regulatory context (e.g., FARs, CS, ACs, AMJ, etc.), this course is intended to give participants an understanding of 'why' various activities are required for approval of the SW in a safety-related system and how evidence

of those activities can be demonstrated in a cost-effective and efficient way. This tutorial is intended to provide a detailed overview of DO-178 (both B and C), what it is, what it is not, how to apply it, and pitfalls to avoid in its application. In addition to explaining the guidelines, the tutorial will discuss differences between 178B and C; how one needs to plan for resiliency in reuse of software. The tutorial will conclude with a summary of relevant Federal Aviation Administration (FAA) and European Aviation Safety Agency (EASA) guidance associated with the application of software design assurance and current research activities on related topics. Even if you have some familiarity with DO-178B, this session will help reinforce and deepen your understanding and provide a useful transition to DO-178C.

#### ML4: DO-178C –Tool Qualification and the Technical Supplements

Tom and Uma Ferrell, Ferrell and Associates Consulting

The release of DO-178C/ED-12C was accompanied by the creation and publication of four additional software design assurance guidelines. The first of these, DO-330, provides a comprehensive standalone treatment of tool qualification with special consideration given to the roles and responsibilities of both tool developers and tool users. DO-330 has been written for use with DO-178C/ED-12C, as well as with DO-254, DO-200A and ARP-4754A. The next three documents serve as technology-specific supplements to DO-178C/ED-12C. DO-331 addresses objectives, activities, and data unique to model-based development and verification. DO-332 and DO-333 provides similar treatments for object-oriented technology and formal methods respectively. This tutorial will provide the student with a comprehensive introduction into all four of these documents. Use of these guidelines in the context of a typical avionics development will be discussed, as will approaches for applying multiple supplements or supplements only to selected areas of the development. Emphasis will be placed on how to integrate the various technical supplement areas into



project planning, the development process, and the impacts to the four integral processes of verification, configuration management, quality assurance, and certification liaison. Students are encouraged (but not required) to combine this tutorial with the newly updated DO-178C/ED-12C for a comprehensive introduction to the new software design assurance.

modifications. We will address key Ethernet mechanisms and challenges for design of critical embedded networks, and discuss approaches to resolving those challenges. Finally, we will relate this discussion to system architecture design and advanced system integration using Ethernet in avionics, vetronics and unmanned systems.

#### **MA4: Formal Methods in RTCA DO-178C**

[Jeffrey Joyce, Critical Systems Labs](#)

This tutorial provides an overview of a document approved by RTCA SC205 and EUROCAE WG71 on the use of formal methods to create certification data in compliance with RTCA DO-178C/ EUROCAE ED-12C. As a member of the subgroup that developed this document, the tutorial presenter will share insights about this guidance and its use by the digital avionics community. Although the tutorial material includes some illustrative examples of how formal methods may be used, the tutorial will focus on strategies for satisfying specific objectives of RTCA DO-178C/ EUROCAE ED-12C, especially objectives that arise from Section 6 (Verification) of DO-178C.

## **Monday, October 6th**

### **Session 5 – Communications**

#### **ML5: Advanced System Integration: Ethernet Networking for Critical Embedded Systems**

[Wilfried Steiner and Mirko Jakovljevic, TTTech](#)

Ethernet is a mature technology developed for best-effort communication in high-volume and consumer applications, but its capabilities are considered to impose limitations on design of fault-tolerant, time-critical, safety-critical and mission-critical systems.

This tutorial will provide participants with an understanding of Ethernet operation in critical embedded systems, and a comparison of novel Ethernet-based standards such as ARINC664, TTEthernet (SAE AS6802), IEEE AVB and IEEE DCB and various Real-Time Ethernet

### **Conference Proceedings delivered by November 10, 2014**

The conference proceedings will be delivered to all conference registrants after the conference. This allows us to include content generated at the conference.

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## Technical Program



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Air Force  
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**GREETINGS:** We appreciate your interest, contribution, and participation in the 33rd meeting of DASC hosted in Colorado Springs, Colorado. We encourage you to attend sessions, read papers, and engage in discussions with aerospace industry, government, and academic researchers and practitioners forging the future of avionics systems. The 33rd DASC technical program complements our conference theme on multi-level reliance from avionics to ground support services and systems-level considerations to maintain air safety. With recent international aircraft-related events, it is this community that can provide a comprehensive approach to air safety amongst many challenging scenarios for passengers and aircrews. Emerging solutions, techniques, and services that touch avionics-related advancements will be highlighted that can provide interoperability for air-/ground-/space-/ and cyber-based systems. Discussions will provide perspectives for both NextGen and SESAR systems-level designs.

**TECHNICAL SESSIONS:** The technical sessions that will be held Tuesday, October 7th through Thursday, October 9th include almost 200 technical presentations from 20+ countries. The presentations will take place in 8 tracks: Air Traffic Management (ATM), Avionics and Flight-Critical Systems (FCS), Communication, Navigation, and Surveillance (CNS) Systems, Integrated Modular Avionics (IMA), Systems Engineering (SE), Unmanned Systems and Networks, Emerging Technologies and Software. In addition, a poster track will be included again this year, allowing one-on-one interaction with authors on special topics. Additional conference activities are planned to foster discussions among participants. We also encourage post-conference collaborations leading to the 34th DASC.

**CONFERENCE PROCEEDINGS CD-ROM:** The 33rd DASC is producing post-conference proceedings to include technical papers, presentations, and plenary speaker contributions. We expect to mail the proceedings to registered attendees by 10 November 2014.

Thanks again for participating. We hope you take advantage of DASC to learn about technical advancements, understand the future of avionics, and network with other professionals as well as enjoy the beauty of Colorado Springs.

**Erik Blasch and Art Tank**

# Technical Program

The technical program for the 33rd DASC will present approximately 200 papers in 8 parallel tracks. This year's theme is "Designing an Air Transportation System with Multi-Level Resilience." Any questions about the technical program should be directed to the Technical Program Chairs, Art Tank (technical.chair@dasconline.org) or Erik Blasch (technical.cochair@dasconline.org). The following schedule, dates, and times are subject to change.

	Tuesday, October 7	Wednesday, October 8		Thursday, October 9	
	Technical Session A 1:30 pm - 5:00 pm	Technical Session B 8:00 am - 11:30 am	Technical Session C 1:30 pm - 5:00 pm	Technical Session D 8:00 am - 11:30 am	Technical Session E 1:30 pm - 5:00 pm
<b>Track 1</b> <b>Air Traffic Management (ATM)</b> Co-Chairs: Bernd Korn, German Aerospace Center (DLR) and Wolfgang Schuster, Imperial College London <b>Summit I</b>	<b>Terminal Area Management</b> Chair: Alexander Kuenz, German Aerospace Center (DLR)	<b>Advanced Approach Procedures and Operations</b> Chair: Ralf H. Mayer, MITRE/CAASD	<b>Transition to Future ATM Systems and Concepts</b> Chair: Bill Bateman, MITRE/CAASD	<b>Performance Assessment &amp; Flow Management</b> Chair: Shannon Zelinski, NASA Ames Research Center	<b>System Wide Information Management (SWIM) &amp; Collaborative Decision Making (CDM)</b> Chair: Patricia Glaab, NASA Langley Research Center
<b>Track 2</b> <b>Avionics and Flight-Critical Systems</b> Co-Chairs: Al Herndon, MITRE and Todd Lovell, Raytheon <b>Heritage A</b>	<b>Avionics Standards and Architectures</b> Co-Chairs: Justin Littlefield, GE Aviation	<b>Emerging Flight Deck Analysis/Airborne Analysis</b> Co-Chairs: Jim DeArmon, MITRE	<b>Equipment/Displays/HMI in ATC and Cockpit</b> Chair: Izabela Gheorghisor, MITRE	<b>User Support</b> Chair: Denise Ponchak, NASA Glenn Research Center	<b>Flight-Critical Systems</b> Chair: Forrest Collier, Innovative Solutions & Support
<b>Track 3</b> <b>Communication, Navigation, and Surveillance (CNS) Systems</b> Co-Chairs: Alope Roy, Honeywell and Michael Schnell, German Aerospace Center (DLR) <b>Heritage B</b>	<b>Communications</b> Chair: Dmitry Shutin, German Aerospace Center (DLR)	<b>Future L-Band Communications</b> Chair: Thomas Gräupl, University of Salzburg	<b>CNS Synergies and APNT</b> Chair: Emmanuel Letsu-Dake, Honeywell Advanced Technology	<b>Surveillance</b> Chair: Michael Brychcy, Boeing	<b>Navigation</b> Chair: Tom McParland, Basic Commerce and Industries, Inc.
<b>Track 4</b> <b>Integrated Modular Avionics (IMA)</b> Co-Chairs: Justin Littlefield, GE Aviation and Scott Crawford, Raytheon <b>Freemont</b>	<b>Avionics Networks</b> Chair: David Rinehart, Saab Sensis	<b>Avionics Applications</b> Co-Chairs: Liling Ren, GE and Mauricio Castillo-Effen, GE	<b>IMA Safety</b> Chair: Aditya Saraf, Saab Sensis	<b>MA Configuration, Modeling &amp; Integration</b> Chair: Bryan Theriault, GE Aviation	
<b>Track 5</b> <b>Systems Engineering</b> Co-Chairs: Paul Kostek, Air Direct Solutions LLC and Bob Fall, Tandel Systems Inc. <b>Learning Center</b>	<b>Electronics</b> Chair: Paul Kostek, Air Direct Solutions LLC	<b>Scenario Testing/Safety Support</b> Chair: Paul Comitz, Boeing	<b>Simulation Support</b> Chair: Bob Fall, Tandel Systems Inc.	<b>Human In the Loop Testing</b> Chair: Paul Kostek, Air Direct Solutions LLC	<b>Avionics Systems Engineering</b> Co-Chairs: Bob Fall, Tandel Systems Inc. and Paul Kostek, Air Direct Solutions LLC
<b>Track 6</b> <b>Unmanned Systems and Networks</b> Co-Chairs: Douglas Abernathy, Lockheed Martin and Peter Skaves, FAA <b>Heritage E</b>	<b>Unmanned Air Systems (UAS) Air Traffic Management</b> Chair: Robert Duffer, FAA	<b>Unmanned Air Systems (UAS) Designs/Advancements</b> Chair: Erik Theunissen, Netherlands Defence Academy (NLDA)	<b>Cyber-Space Systems/Space Systems</b> Chair: Sherif Ali, GE Aviation Systems	<b>Military and Autonomous Flights</b> Chair: Douglas Abernathy, Lockheed Martin	
<b>Track 7</b> <b>Emerging Technologies</b> Co-Chairs: Mary Ellen Miller, MosaicATM and Cynthia DeBisschop <b>Carson</b>	<b>Weather Information for Decision Support</b> Chair: Cynthia DeBisschop	<b>Separation in High Traffic Density Airspace</b> Chair: Timothy Waldron, Saab Sensis Corporation	<b>Collision Risk and Operations Safety</b> Chair: Leihong Li, Georgia Institute of Technology	<b>Improving Pilot Situational Awareness</b> Chair: Mary Ellen Miller, MosaicATM	<b>Safety Technologies and Analytical Methods</b> Chair: Cynthia DeBisschop
<b>Track 8</b> <b>Software</b> Co-Chairs: Paul Miner, NASA and Phil Smith, Ohio State University <b>Heritage F</b>	<b>Software Design, Validation and Verification</b> Chair: Pavel Paces, Czech Technical University in Prague	<b>System Safety and System Architectures</b> Chair: Chris Wargo, Mosaic ATM	<b>System Safety, Certification and Performance Modeling</b> Chair: Wilfried Steiner, TTTech		



# Technical Session A

## Tuesday, October 7

A	Track 1: Air Traffic Management [Summit I]	Track 2: Avionics and Flight-Critical Systems [Heritage A]	Track 3: CNS Systems [Heritage B]	Track 4: IMA [Freemont]
	Terminal Area Management	Avionics Standards and Architectures	Communications	Avionics Networks
1:30	1A1 A Framework for Integrating Arrival, Departure, and Surface Operations Scheduling Shannon Zelinski <i>NASA Ames Research Center</i>	2A1 CAN Based Protocols in Avionics Rick Lotoczky <i>Vector Cantech, Inc.</i>	3A1 A Study of Future Communications Concepts and Technologies for the National Airspace System—Part III Denise Ponchak <i>NASA Glenn Research Center</i>	4A1 Network Topology Optimization for Distributed Integrated Modular Avionics Bjoern Annighoefer <i>Hamburg University of Technology / TuTech SYSTAR Innovation GmbH</i>
2:00	1A2 Dynamic Stochastic Scheduler for Integrated Arrivals and Departures Min Xue <i>University of California at Santa Cruz</i>	2A2 Recent IEEE 802 Developments and Their Relevance for the Avionics Industry Wilfried Steiner <i>TTTech Computertechnik AG</i>	3A2 Selected Results for IPv6 Based SWIM, CP-DLC, and VoIP in the SANDRA Flight Trial Campaign Thomas Gräupl <i>University of Salzburg</i>	4A2 Research on Integrated Technology and Model in Avionics System Guoqing Wang <i>China National Aeronautical Radio Electronics Research Institute</i>
2:30	1A3 Optimizing Integrated Terminal Airspace Operations Under Uncertainty Christabelle Bosson <i>University of California Santa Cruz - University Affiliated Research Center</i>	2A3 Universal Arment Interface on MIL-STD-1553 with the Data Distribution Service Yildiz Bektas <i>Tai</i>	3A3 Extending WiMAX with End-to-End Security and Correspondent Node Anchored Mobility Thomas McParland <i>BCI</i>	4A3 An Affordable IMA Bridge for Refreshing Deployed Avionics Systems Thomas Gaska <i>Lockheed Martin MST Owego</i>
3:00	<b>Break</b>			
3:30	1A4 Improving Departure Throughput by Dynamically Adjusting Inter-arrival Spacing Hyo-sang Yoo <i>San Jose State University Research Foundation/ NASA Ames Research Center</i>	2A4 Performance Evaluation of Avionics Communication Systems with Radio Frequency Interference Gang Wang <i>Intelligent Fusion Technology, Inc.</i>	3A4 Results of a VDL 2 Subnet Simulation in the Approach Area to El Dorado Airport Leonardo Gomez <i>National University of Colombia</i>	4A4 A Resilient and Distributed Cabin Network Architecture Nicolai Kuntze <i>Fraunhofer SIT</i>
4:00	1A5 An Operational Field Evaluation of an Airport Configuration Management Decision Support Tool Christopher Provan <i>Mosaic ATM</i>	2A5 Analysis and Architecture Design of Time-Triggered Avionics WDM Network Ying Xiong <i>Beihang University</i>	3A5 Adaptive Error Control Coding for Airborne Communications Tao Chen <i>Aviation Industry of China (AVIC)</i>	4A5 Embedded Cloud Computing for Critical Systems Mirko Jakovljevic <i>TTTech</i>
4:30			3A6 An Adaptive DS-CDMA Receiver for Air Traffic Control Tao Chen <i>Aviation Industry of China (AVIC)</i>	4A6 OpenFlow Channel Deployment Algorithm for Software-Defined AFDX Zheng Li <i>Beihang University</i>

A	Track 5: Systems Engineering [Learning Center]	Track 6: Unmanned Systems and Networks [Heritage E]	Track 7: Emerging Technologies [Carson]	Track 8: Software [Heritage F]
	Electronics	UAS Air Traffic Management	Weather Information for Decision Support	Software Design, Validation and Verification
1:30	5A1 DO-254 Testing of High Speed FPGA Interfaces Nir Weintraub <i>Verisense</i>	6A1 Assuring Ground-Based Detect and Avoid for UAS Operations Ganesh Pai <i>SGT / NASA Ames Research Center</i>	7A1 Mini Global Risk Mitigation Demonstration Corissa Robinson <i>Mosaic ATM</i>	8A1 Technology Independent Assurance Method (TIAM) - A Comprehensive Framework for Design Assurance Arguments Michael DeWalt <i>Federal Aviation Administration</i>
2:00	5A2 Investigation of Electrical Power Generation and Distribution versus Product EMC Jan Leuchter <i>University of Defence</i>	6A2 NAS Operational Implications and Infrastructure Changes for UAS Integration Chris Wargo <i>Mosaic ATM, Inc.</i>	7A2 Analysis and Prediction of Weather Impacted Ground Stop Operations Yao Wang <i>NASA Ames Research Center</i>	8A2 An Approach to Generate Optimized Cyclic Scheduling from AADL Specification Henrique Forlani Masini <i>Embraer</i>
2:30	5A3 Impact Assessment of Power Electronics on Aircraft Communication Systems Martin Zeinert <i>University of Defence</i>	6A3 Development of Simulation-Supported Long Range B-VLOS RPAS Mission Planning for Remote Sensing in Alpine Disaster Operations Management Thomas Gräupl <i>University of Salzburg</i>	7A3 Trajectory Prediction in North Atlantic Oceanic Airspace by Wind Networking Olga Rodionova <i>ENAC (L'Ecole Nationale de l'Aviation Civile)</i>	8A3 Taming Interrupts: Deterministic Asynchronicity in an ARINC 653 Environment Steven VanderLeest <i>DornerWorks, Ltd. and Calvin College</i>
3:00 Break				
3:30	5A4 Statistical Evaluation of Multiple Low-cost MEMS Sensors for Altitude Measurement Pavel Paces <i>Czech Technical University in Prague</i>	6A4 Antenna and Frequency Diversity in the Unmanned Aircraft Systems Bands for the Over-Sea Setting David Matolak <i>University of South Carolina</i>	7A4 Departure Flow Efficiency and the Identification of Causes for Inefficiencies Jim DeArmon <i>MITRE/CAASD</i>	8A4 Verification of Quasi-Synchronous Systems with Uppaal Siddhartha Bhattacharyya <i>Rockwell Collins</i>
4:00	5A5 DME Coherency Measurement Using a Radio Receiver Implemented on FPGA Device Pavel Dycka <i>University of Defence</i>	6A5 Refinement of a Conflict Probe Algorithm and Display to Support Well Clear: Concept and Implementation Erik Theunissen <i>NLDA</i>		8A5 Adapting DO-178C Processes by Implementing a Reverse Engineering Technique Mehmet Koray Bingol <i>TUBITAK BILGEM</i>
4:30				8A6 Design for ARINC 653 Conformance: Architecting Independent Validation of a Safety-Critical RTOS Ahmet Alptekin <i>TUBITAK</i>

# Technical Session B

## Wednesday, October 8

B	Track 1: Air Traffic Management [Summit I]	Track 2: Avionics and Flight-Critical Systems [Heritage A]	Track 3: CNS Systems [Heritage B]	Track 4: IMA [Freemont]
	Advanced Approach Procedures and Operations	Emerging Flight Deck Analysis/Airborne Analysis	Future L-Band Communications	Avionics Applications
8:00	1B1 A Novel Application of TMA to Converging Runway Operations in a Simulated NextGen Environment Jeffrey Homola <i>San Jose State University/NASA Ames Research Center</i>	2B1 A Multiple Hypotheses Prediction Method for Improved Aircraft State Awareness and Altering Pengfei Duan <i>Ohio University</i>	3B1 DME Signal Power from Inlay LDACS1 Perspective Mohamad Mostafa <i>German Aerospace Center DLR</i>	4B1 Recommendations for Managing Complexity in Electronic Chart Information Displays Emmanuel Letsu-Dake <i>Honeywell Aerospace</i>
8:30	1B2 Paired Approaches to Closely Spaced Parallel Runways: Results of Real Time Pilot and ATC Simulations David Domino <i>MITRE/CAASD</i>	2B2 Using Vision System Technologies to Enable Operational Improvements for Low Visibility Approach and Landing Operations Lynda Kramer <i>NASA Langley Research Center</i>	3B2 Iterative Interference Mitigation and Channel Estimation for LDACS1 Qiaoyu Li <i>National Key Laboratory of CNS/ATM, Beihang University</i>	4B2 Flight Testing of Agent Supervisory Control on Heterogeneous Unmanned Aerial System Platforms Georg Rudnick <i>Institute of Flight Systems, University of the Bundeswehr, Munich, Germany</i>
9:00	1B3 Flight Testing Steep Segmented Approaches for Noise Abatement Bernd Korn <i>DLR - German Aerospace Center</i>	2B3 RNP to Precision Approach Transition Flight Simulations David De Smedt <i>EUROCONTROL</i>	3B3 LDACS 1 Conformance and Compatibility Assessment Bernhard Haindl <i>Frequentis</i>	4B3 Automated Discovery of Flight Track Anomalies Bryan Matthews <i>SGT Inc. NASA Ames Research Center</i>
9:30	<b>Break</b>			
10:00	1B4 Calculation of Flight Deck Interval Management Assigned Spacing Goals Subject to Multiple Scheduling Constraints John Robinson III <i>NASA</i>	2B4 Robust, Integrated Arrival-Departure-Surface Scheduling Based on Bayesian Networks Aditya Saraf <i>Saab Sensis Corporation</i>	3B4 Distributed Radio Resource Allocation for Aeronautical Short Messages in LDACS1 Zaichang Zhao <i>Beihang University</i>	4B4 Concept of an Integrated Apron Controller Working Position Implemented and Tested in Field Trials Guerluek Hejar <i>German Aerospace Center (DLR)</i>
10:30	1B5 Optimal Trajectory Control Law Based on DDP for Continuous Descent Arrivals Gustavo Lee <i>Georgia Institute of Technology</i>	2B5 Design of Cockpit Displays To Explicitly Support Flight Crew Intervention Tasks Lance Sherry <i>George Mason University</i>	3B5 Interference Rejection for MIMO-NCI-OFDM System in the L-Band Yun Bai <i>School of Electronic and Information Engineering, BeiHang Univ., Beijing, China</i>	4B5 Research on Multi-Platforms Passive Location for Multi-Targets Fei Deng <i>School of Information Science and Technology of Tsinghua University</i>
11:00			3B6 Broadband Aeronautical Communication with the Burst Data Transmission in the 4DT Navigation Chao Zhang <i>Labs of Avionics, School of Aerospace, Tsinghua University</i>	

B	<b>Track 5:</b> Systems Engineering [Learning Center]	<b>Track 6:</b> Unmanned Systems and Networks [Heritage E]	<b>Track 7:</b> Emerging Technologies [Carson]	<b>Track 8:</b> Software [Heritage F]
	Scenario Testing/Safety Support	UAS Designs/Advancements	Separation in High Traffic Density Airspace	System Safety and System Architectures
8:00	5B1 Appreciating the Effectiveness of Single Event Effect Mitigation Techniques Laurence Mutuel <i>CGH Technologies, Inc.</i>	6B1 A Safety Assessment on the Use of CPDLC in UAS Communication System Magali Andreia Rossi <i>University of Florence</i>	7B1 Design of Aircraft Space Indexed Guidance Along an Airstream Felix Mora-Camino <i>ENAC</i>	8B1 Service-Oriented Agent Architecture for Unmanned Air Vehicles Carlos C. Insaurralde <i>Heriot-Watt University</i>
8:30	5B2 SME-Defined Scenarios for Autonomy (SDSA): A Method for Exploring Complex Aviation System Safety and Performance David Rinehart <i>Saab Sensis Corporation</i>	6B2 Aircraft Ground Monitoring with High Performance Computing Multicore Enabled Video Tracking Bin Jia <i>Intelligent Fusion Technology</i>	7B2 Maintaining Separation in Shared Airspace: Climbing Departures Through Arrival Airspace with Decision Support Tools Eric Chevalley <i>San Jose State University / NASA Ames Research Center</i>	8B2 Service Selection Approach for SWIM Consumer Application based on Semantic Annotations in SOAML Architecture Inaldo Costa <i>Technological Institute of Aeronautics (ITA)</i>
9:00	5B3 Analytics in the Aviation Domain Paul Comitz <i>The Boeing Company</i>	6B3 Design and Implementation of Fuzzy Logic Controller for Quad Rotor UAV Muthu Madhava Kumar <i>Madras Institute of Technology</i>	7B3 Development of Route Crossing Tool for Shared Airspace Environments Daphne Rein-Weston <i>San Jose State University / NASA Ames Research Center</i>	8B3 Autonomic Control Architecture for Avionics Software of Unmanned Space Vehicles Carlos C. Insaurralde <i>Heriot-Watt University</i>
9:30 <b>Break</b>				
10:00	5B4 Applying Software Model Checking to PALS Systems Min-Young Nam <i>University of Illinois at Urbana-Champaign</i>	6B4 Design of Simulation Platform for a Quadrotor UAV using X-Plane and Matlab/Simulink Refson Brice <i>Madras Institute of Technology</i>	7B4 Examining Operations Coupling Autoflight to ADS-B Targets in High Traffic Density Airspace Operations Rachel Haga <i>Georgia Institute of Technology</i>	8B4 A Prototype Implementation of OpenGL SC-Compatible Library Based on a Massively Parallel Architecture Nakhoon Baek <i>Kyungpook National University / Mobile Graphics Inc.</i>
10:30	5B5 Scenario Based Verification and Validation of Autonomy, Authority and Responsibility in Aviation Concepts of Operation Raunak Bhattacharyya <i>Georgia Institute of Technology</i>	6B5 Design And Development of Unmanned Tilt T-Tri Rotor Aerial Vehicle Anand T <i>Madras Institute of Technology, Chennai, Tamil Nadu, India</i>		
11:00	5B6 Fidelity Evaluation of Airborne Sensor's Simulation Model Using System Identification Techniques Anishiya Regil <i>Madras Institute of Technology, Anna University</i>			



# Technical Session C

Wednesday, October 8

C	Track 1: Air Traffic Management [Summit I]	Track 2: Avionics and Flight-Critical Systems [Heritage A]	Track 3: CNS Systems [Heritage B]	Track 4: IMA [Freemont]
	Transition to Future ATM Systems and Concepts	Equipment/Displays/HMI in ATC and Cockpit	CNS Synergies and APNT	IMA Safety
1:30	1C1 NextGen Technologies on the FAA's Standard Terminal Automation Replacement System Kevin Witzberger <i>NASA Ames Research Center</i>	2C1 Applying a Model-Based Observer to Examine Underlying Mechanisms of Spatial Disorientation Anil Bozan <i>Georgia Institute of Technology</i>	3C1 LDACS1 Ranging Results with Doppler Smoothing from New Flight Experiments Dmitriy Shutin <i>German Aerospace Center</i>	4C1 Safety Analysis and Optimization for Networked Avionics System Chao Zhang <i>School of Aerospace Engineering, Tsinghua University</i>
2:00	1C2 Increasing the Margins – More Freedom in Trajectory-Based Operations Alexander Kuenz <i>DLR German Aerospace Center</i>	2C2 An Evaluation Environment for a Helmet-Mounted Synthetic Degraded Visual Environment Display Niklas Peinecke <i>DLR (German Aerospace Center)</i>	3C2 DME/DME Navigation Using a Single Low-Cost SDR and Sequential Operation Taher Jalloul <i>Université du Québec à Montréal</i>	4C2 Safety Assessment of the Avionics Data Network Changxiao Zhao <i>Civil Aviation University of China</i>
2:30	1C3 Controller Inhibition of Automated Conflict Resolutions in a Maximum Nextgen Condition Sarah Hunt <i>San Jose State University / NASA Ames Research Center</i>	2C3 Touch on the Flight Deck: The Impact of Display Location, Size, Touch Technology and Turbulence on Pilot Performance Sonia Dodd <i>Honeywell</i>	3C3 Question: Alternate Position, Navigation Timing, APNT? Answer: eLORAN Albert Helfrick <i>Embry-Riddle Aeronautical University</i>	4C3 A New Method for Integrated Modular Avionics Safety Analysis by Using Data Mining Technology Miao Wang <i>Science and Technology on Avionics Integration Laboratory</i>
3:00	<b>Break</b>			
3:30	1C4 Identifying Qualitative Factors for Sector Reconfiguration and D-side Assignments Paul Lee <i>San Jose State University</i>	2C4 Pilot Responses to Traffic Events During NextGen Operations in High Traffic Density Terminal Areas Dhruv Thakkar <i>Cognitive Engineering Center, Georgia Institute of Technology</i>	3C4 Civil Aircraft Positioning with the Airborne Communication Datalink Chao Zhang <i>Labs of Avionics, School of Aerospace, Tsinghua University</i>	4C4 DSM Reliability Concerns - Impact on Safety Assessment Didier Regis <i>Thales Avionics</i>
4:00	1C5 Five Transition Strategies for Sectorless ATM Bettina Birkmeier <i>DLR (German Aerospace Center)</i>	2C5 Touch Control in Flight Automation Systems Jan Vlk <i>Brno University of Technology</i>	3C5 Integrated Positioning with Magnetic Field and Wireless Local Area Network for Aircraft Automatic Taxiing Chao Zhang <i>Labs of Avionics, School of Aerospace, Tsinghua University</i>	
4:30	1C6 Dynamically Adjusting Network Architecture for Congestion Optimization in Terminal Airspace Rajarshi Sinha <i>Birla Institute of Technology &amp; Science</i>			

C	Track 5: Systems Engineering [Learning Center]	Track 6: Unmanned Systems and Networks [Heritage E]	Track 7: Emerging Technologies [Carson]	Track 8: Software [Heritage F]
	Simulation Support	Cyber-Space Systems/Space Systems	Collision Risk and Operations Safety	System Safety, Certification and Performance Models
1:30	5C1 TCAS Verification Environment Based on Model and Software Bus Technique Jie Li <i>China National Aeronautical Radio Electronics Research Institute</i>	6C1 Towards a Secured Space Cyber-Physical System Erik Blasch <i>United States Air Force</i>	7C1 Effect of Traffic Position Accuracy for Conducting Safe Airport Surface Operations Denise Jones <i>National Aeronautics and Space Administration</i>	8C1 Towards a Lean Tool Qualification Process Matteo Bordin <i>AdaCore</i>
2:00	5C2 Design of DIMA Scheduling Algorithm Based on Network Partition Integrating Model Yu Han <i>Beihang University</i>	6C2 Network Survivability Oriented Markov Games (NSOMG) in Wideband Satellite Communications Dan Shen <i>Intelligent Fusion Technology, Inc.</i>	7C2 Safely Conducting Airport Surface Trajectory-Based Operations Denise Jones <i>National Aeronautics and Space Administration</i>	8C2 Big Data in the Air Force - Process, Use and Understand for Safety Petr Frantis <i>University of Defense</i>
2:30	5C3 Distributed and Real-Time Integrated Simulation System on Avionics Yang Liu <i>Northwest Polytechnical University</i>	6C3 Distributed QoS Awareness in Satellite Communication Network with Optimal Routing (QuASOR) Erik Blasch <i>AFRL/RIEA</i>	7C3 Coordination Between Sectors in Shared Airspace Operations Bonny Parke <i>San Jose State University Foundation/NASA Ames</i>	8C3 Managing Cache Partitioning in Multicore Processors for Certifiable, Safety-Critical Avionics Software Applications Tim King <i>DDC-I</i>
3:00	Break			
3:30	5C4 A New Hybrid Culling Scheme for Flight Simulator Ki-II Kim <i>Gyeongsang National University</i>	6C4 Implementing Space Separation Functionalities into Linux-Based Spacecraft Computer Duksoo Kim <i>Chungnam National University</i>	7C4 Survey and Analysis of ATC Command Entries and their Impact on the Conflict Probe of ERAM Jasenska Rakas <i>University of California, Berkeley</i>	8C4 Machine Learning Model for Aircraft Performances Marko Hrastovec <i>Slovenia Control, Ltd.</i>
4:00	5C5 Integrated Simulation Platform Jan Vlk <i>Brno University of Technology</i>	6C5 CAPE-II: Design, Development, Launch, and On-Orbit Operation of an Experimental Picosatellite Alexander Lanolos <i>University of Louisiana at Lafayette</i>	7C5 Investigating the Causality of Potential Collisions on the Airport Surface Timothy Waldron <i>Saab Sensis Corporation</i>	8C5 Open Source, 3-D Terrain Visualization on a Mobile Device Joseph Rios <i>NASA Ames Research Center</i>
4:30				

# Technical Session D

Thursday, October 9

D	Track 1: Air Traffic Management [Summit I]	Track 2: Avionics and Flight-Critical Systems [Heritage A]	Track 3: CNS Systems [Heritage B]	Track 4: IMA [Freemont]
	Performance Assessment & Flow Management	User Support	Surveillance	MA Configuration, Modeling & Integration
8:00	1D1 Airborne Execution of Flow Strategies Simulation Mary Ellen Miller <i>Mosaic ATM</i>	2D1 An Energy Management Display For General Aviation Safety Enhancements Tony Adami <i>Ohio University</i>	3D1 Passive Radar for Terminal Area Surveillance: Performance Feasibility Study William Barott <i>Embry-Riddle Aeronautical University</i>	4D1 Using Design Patterns for Safety Assessment of Integrated Modular Avionics Humberto Matos <i>Aeronautics Institute of Technology (ITA)</i>
8:30	1D2 Resilience of the National Airspace System Structure: A Data-Driven Network Approach Aude Marzuoli <i>Georgia Institute of Technology</i>	2D2 Analysis of Advanced Flight Management Systems - PBN to xLS Albert Herndon <i>MITRE/CAASD</i>	3D2 Enhanced Air Operations for Ground Situational Awareness Erik Blasch <i>AFRL/RIEA</i>	4D2 Research on Model-Based Safety Assessment Method for Integrated Avionics System Qingfan Gu <i>Science and Technology on Avionics Integration Laboratory Shanghai China</i>
9:00	1D3 Development of Miles-in-Trail Passback Restrictions for Air Traffic Management Kapil Sheth <i>NASA Ames Research Center</i>	2D3 BMW iDrive Automotive HUD Device in EFIS Control Pavel Paces <i>Czech Technical University in Prague</i>	3D3 Algorithm for Military Object Detection Using Image Data Ich Quy Pham <i>University of Defence</i>	4D3 Hardware-Software Allocation Specification of IMA Systems for Early Simulation Akos Horvath <i>Budapest University of Technology and Economics</i>
9:30	<b>Break</b>			
10:00	1D4 Numerical Analysis of Surface Congestion Factors for Modeling of Taxi-Out Times Izumi Yamada <i>Electronic Navigation Research Institute</i>	2D4 Improved Automation and Human-Machine Interface Continuity through Utilization of Synthetic Data Matt Miltner <i>Ohio University</i>	3D4 Range Determination of the Modern Airport Lightning Systems Radim Bloudicek <i>University of Defence</i>	4D4 An Approach to IMA System Design and Development Based on Models Jian-min Wu <i>China National Aeronautical Radio Electronics Research Institute</i>
10:30		2D5 Ubiquitous Big Data vs. Human Frailty on the Flight Deck Hugh Blair-Smith <i>Down to the Metal</i>	3D5 Comparison of Methods for Using Pressure Sensors for Airplane Attitude Estimation Jan Popelka <i>Czech Technical University in Prague</i>	4D5 Architecture of Resource Configuration in Avionics Based on Control Allocation Chengzhi Chi <i>China National Aeronautical Radio Electronics Research Institute</i>
11:00		2D6 Matching of Real and Synthetic Images for Combined Vision System Oleg Vygolov <i>State Research Institute of Aviation Systems</i>		4D6 IMADE: Integrated Modular Avionic Development Environment Bruno Tavares <i>GMVIS-Skysoft</i>

D	<b>Track 5:</b> Systems Engineering [Learning Center]	<b>Track 6:</b> Unmanned Systems and Networks [Heritage E]	<b>Track 7:</b> Emerging Technologies [Carson]	<b>Track 8:</b> Software [Heritage F]
	Human in the Loop Testing	Military and Autonomous Flights	Improving Pilot Situational Awareness	
8:00	5D1 Benefits of a Unified LaSRS++ Simulation for NAS-Wide and High-Fidelity Modeling <i>Patricia Glaab</i> <i>NASA</i>	6D1 New Aviation Vehicles in the NextGen Environment: Procedure Design in Congested Terminal Airspace <i>Jasenka Rakas</i> <i>University of California, Berkeley</i>	7D1 Design of Deep Flight Deck Integration (DFDI) for Data Communications System (DataComm) <i>Jasenka Rakas</i> <i>University of California, Berkeley</i>	
8:30	5D2 A Closer Look at Automation Behavior During a Human-in-the-Loop Simulation <i>Joey Mercer</i> <i>San Jose State University / NASA Ames Research Center</i>	6D2 A D-MILS Console Subsystem for Advanced ATM Communication Services <i>Wolfgang Kampichler</i> <i>Frequentis AG</i>	7D2 AIS and MET Data Link Services Modeling and Analysis <i>Izabela Gheorghisor</i> <i>MITRE</i>	
9:00	5D3 The Research on the Task Synthesis Technology of the Airplane <i>Wen-hao Wang</i> <i>AVIC Aeronautical Radio Electronics Research Institute</i>	6D3 Airborne Radar for High Maneuvering Stealth Target <i>Chao Zhang</i> <i>School of Aerospace Engineering, Tsinghua University, Beijing, P. R. China</i>	7D3 Analysis of ADS-B Performance for Use in ACAS Systems <i>Maarten Kastelein</i> <i>Ohio University</i>	
9:30	<b>Break</b>			
10:00	5D4 THRUST: A Method for Speeding up the Creation of Process-Related Deliverables <i>Barbara Gallina</i> <i>Mälardalen University</i>	6D4 PTSD Monitoring by Using Brain Computer Interface for Unmanned Aerial Vehicle Operator Safety <i>Marwa El Diwiny</i> <i>Minia University</i>	7D4 Research on a GPWS /TAWS Simulator with Forward-looking Alerting Function Module <i>Gang Xiao</i> <i>School of Aeronautics and Astronautics, Shanghai Jiao Tong University</i>	
10:30	5D5 How Technological Constraints Could Influence Competitiveness: An Empirical Study of Avionics Systems <i>Aurélie Beaugency</i> <i>Thales Avionics</i>	6D5 Long Range Trajectory Prediction based on Modeling Cost Index Strategy <i>Eduardo Gallo</i> <i>Boeing RTE</i>	7D5 Status and Challenges of Synthetic Vision System for Civil Aviation of China <i>Yupeng Zhang</i> <i>China Aeronautical Radio Electronics Research Institute</i>	
11:00	5D6 Developing a CDS with SCRUM in an Interdisciplinary Academic Project <i>Rafael Coelho</i> <i>ITA - Aeronautics Institute of Technology</i>	6D6 Required Surveillance Sensors for DAA <i>Eric Euteneuer</i> <i>Honeywell</i>	7D6 Pilot Timeliness of Safety Decisions Using Information Fusion Situation Awareness <i>Erik Blasch</i> <i>Air Force Research Laboratory</i>	



# Technical Session E

Thursday, October 9

E	Track 1: Air Traffic Management [Summit I]	Track 2: Avionics and Flight-Critical Systems [Heritage A]	Track 3: CNS Systems [Heritage B]	Track 4: IMA [Freemont]
	SWIM & Collaborative Decision Making	Flight-Critical Systems	Navigation	
1:30	1E1 NextGen Architectures to Include Pilots in Collaborative Decision Making <i>Rick Wilber</i> <b>Boeing</b>	2E1 Simulating Faults in Integrated Systems and Their Impact on the Aircraft <i>Aparna Kansal</i> <b>Georgia Institute of Technology</b>	3E1 Implementation of Vector Tracking Loop Algorithm in Modern GPS Receiver <i>Bac Vu</i> <b>University of Defence</b>	
2:00	1E2 The Changing State of Airport Automation <i>Frank Matus</i> <b>Thales</b>	2E2 Safety and Reliability Analysis of Wireless Data Communication Concepts for Flight Control Systems <i>Aysegul Aglargo</i> <b>German Aerospace Center</b>	3E2 Magnetometer with an Automatic Distortion Compensation and Its Usage for INS Aiding <i>Pavel Paces</i> <b>Czech Technical University in Prague</b>	
2:30	1E3 Architecture and Capabilities of a Data Warehouse for ATM Research <i>Michelle Eshow</i> <b>NASA Ames Research Center</b>	2E3 Line-of-Sight MIMO in Aircraft-to-Aircraft Data Links <i>Dominik Rieth</i> <b>Airbus Group Innovations</b>	3E3 Characterizations of Navigation Performance in Terminal Performance-Based Navigation Operations <i>Ralf H. Mayer</i> <b>The MITRE Corporation</b>	
3:00	<b>Break</b>			
3:30		2E4 An Application of A Prototype Credible Autocoding and Verification Tool-chain <i>Timothy Wang</i> <b>Georgia Institute of Technology</b>	3E4 Performance Based Navigation (BPN) Analysis System <i>Mushava Kodzwa</i> <b>The MITRE Corporation</b>	
4:00		2E5 New Avionics Architectures Enabled by ARINC 818-2 <i>Paul Grunwald</i> <b>Great River Technology</b>		
4:30				

E	Track 5: Systems Engineering [Learning Center]	Track 6: Unmanned Systems and Networks [Heritage E]	Track 7: Emerging Technologies [Carson]	Track 8: Software [Heritage F]
	Avionics Systems Engineering		Safety Technologies and Analytical Methods	
1:30	5E1 Avionics System Unified Lifecycle Model Architecting and Application Yaoming Zhou <i>Beihang University</i>		7E1 On-Board Energy Recovery Assistance for Time-Constrained Descents Brian Zammit <i>University of Malta</i>	
2:00	5E2 Scheduling Algorithm of Time-Triggered Ethernet Based on Periodic Tasks Zhong Zheng <i>Beihang University</i>		7E2 Probabilistic Analysis of Response Latency for Rate-Constrained Traffic in the TTEthernet Network Luxi Zhao <i>Beihang University</i>	
2:30	5E3 Design of Time-Triggered Communication Scheduling for SpaceWire Networks Yu Han <i>Beihang University</i>		7E3 Continuous Safety Analysis for Avionics System with Dempster-Shafter Theory Chao Zhang <i>School of Aerospace Engineering, Tsinghua University</i>	
3:00 Break				
3:30	5E4 Modeling of Aircraft Environmental Control System using MATLAB/SIMULINK Bairavi J <i>Madras Institute of Technology</i>		7E4 Implementation of Anti Stealth Technology for Safe and Secure Operation of the Unmanned Aerial Vehicle Marwa El Diwiny <i>Minia University</i>	
4:00	5E5 High Precision Magnetic Aeronautical Navigation for the Civil Aircraft Chao Zhang <i>Labs of Avionics, School of Aerospace, Tsinghua University</i>			
4:30	5E6 Short Range Magnetic Communication of the Contactless Sensors on Aircraft Chao Zhang <i>Labs of Avionics, School of Aerospace, Tsinghua University</i>			

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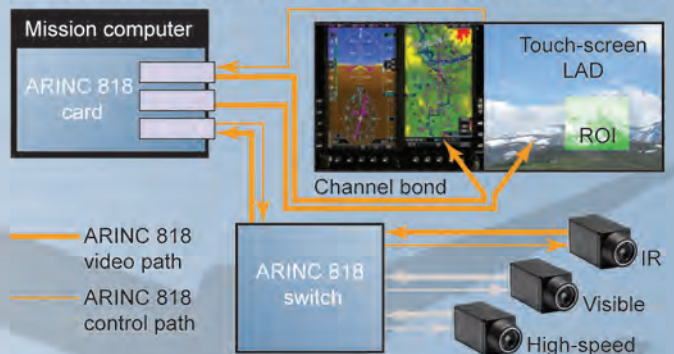
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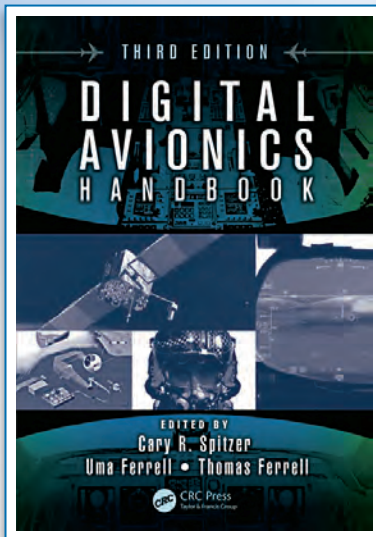
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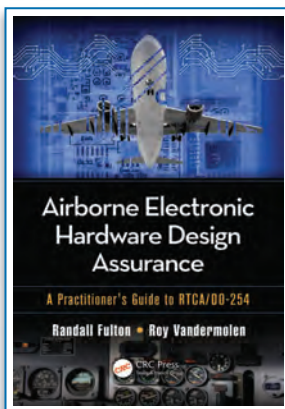
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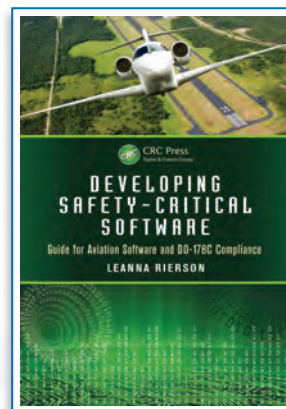
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#### ABSTRACT DETAILS

Authors are invited to submit abstracts of no more than 750 words before 6 March 2015 to [www.dasconline.org](http://www.dasconline.org). Student papers and ideas for invited sessions are welcome.

34th DIGITAL AVIONICS SYSTEMS CONFERENCE

# CALL FOR PARTICIPATION

## Technical Papers, Tutorials & Exhibits

### How Are Global Airspace and Equipage Mandate Challenges Being Addressed by Avionics R&D?

We welcome everyone to join us for the 34th DASC in Prague, Czech Republic

**CONFERENCE THEME:** Future next generation Air Traffic Management Systems will require new emerging Communication, Navigation and Surveillance Avionics. In order to maximize their increased safety and efficiency, new aircraft equipage will be necessary. This year's conference theme addresses the question of how past, near, and future mandates for safe air transportation, global situational awareness, and efficient air operations drive avionics research and development. Continuous developments in telecommunications, computing, storage, and presentation may suggest improvements across the board resulting in new and evolving mandates for safe and efficient air transportation.

**AVIONICS AND ATM SYSTEMS:** The conference will continue to maintain a dual focus on aircraft avionics and air traffic management systems. Emerging research, development, and analysis related to avionics equipage, aircraft interoperability, and ground and space-based infrastructures are significant drivers for both the North American NextGen and Single European Sky (SESAR) Initiatives.

#### TECHNICAL CHALLENGES REMAIN:

- Past mandates – their impact and potential for further improvement in relation to compatibility and retrofit possibilities
- Current mandates – expectations and new requirements such as authentication and encryption
- Future mandates – drivers for significant improvements in safety and efficiency
- Decision-support tools and Knowledge-based Systems to improve system state awareness, predict change, and provide safe solutions
- Integrated Information Management Systems (airborne and ground-based) to support decision-making
- Sense and Avoid Systems that provide autonomous safe self-separation
- Introduction of new vehicles such as UAS into the Global Airspace
- Reliable Communications, Navigation, and Surveillance technologies to enable the implementation of future ATM Systems

**PAPERS, PANELS, EDUCATION, AND WORKSHOPS:** The Technical and Professional Education Programs will incorporate hundreds of papers and dozens of tutorials from international researchers, innovators, engineers, users, and designers. There will be panel discussions and keynote presentations by engineering, management and operational leaders that are shaping the industry. Attendees can participate in active conversations with colleagues who are the experts and leaders in the field. We welcome you to join us and participate in the 34th DASC as we engage in the important issues of the avionics industry!



# TECHNICAL PROGRAM

## Topics of Interest Include, But Are Not Limited To:

**Open Architectures:** Open interface standards, viability of open and closed architectures, operating systems, ARINC-653, alternate API solutions, communication standards, use of Commercial-Off-The-Shelf (COTS) technologies; modularity vs. scalability.

**IMA Design, Integration and Optimization:** Allocation process and tools for Integrated Modular Avionics (IMA) system resources and performance, integration tools, verification & certification, configuration strategies, scalability, assessing system demand and resource availability, mitigation of common mode failures, system maintenance, and optimization techniques.

**Avionics Communications Network Infrastructure:** Self-forming/self-healing networks, wireless networks, quality of service (QoS), data buses, data partitioning, protocols, multi-protocol gateways, message routing, spectrum, and passenger communication mechanisms.

**Integrated Avionics for Information Security and Integrity:** Multiple Independent Levels of Security/Safety (MILS), physical & virtual system firewalls, data security for shared data buses, operating system security, information monitoring and quality assurance, information management.

**Communications/Navigation/Surveillance (CNS) Systems:**

Communications systems, data links, satellite-based navigation and landing systems, inertial navigation, and surveillance systems for traffic and collision avoidance.

**Human Factors:** Issues on human interaction with automation such as mode awareness, flight deck displays and decision support tools, methods for avoiding the presentation of misleading information, and information abstraction and conveyance concepts that enable of workload management and crew coordination.

**Flight Deck Systems and Interfaces:** Advanced systems, interfaces, and enabling avionics technologies that can combine multiple sources of disparate data to provide coherent and effective displays that reduce pilot error, confusion, or misinterpretation.

**Air Traffic Management Decision Support Tools:** Software-based systems that provide controllers with more accurate predictive information about local and national traffic flow, weather and routing for safe, efficient, and effective air transportation.

**Systems Engineering, Design Methods, and Tools:** Optimization of the hardware and software systems development process including solutions and lessons-learned. Predictive capabilities with quantified confidence levels for uncovering latent design flaws or undesired performance characteristics.

**Software Engineering:** Development of large-scale systems with multiple design assurance levels, including novel approaches, processes and formal methods for design, testing, and certification.

**Flight Critical Systems:** Methods, techniques and tools for definition, design, verification, integration, validation, and certification of complex, highly integrated flight critical systems.

**UAS Vehicles and Systems:** Avionics systems for large and small UAS, issues with integrating UAS into the Airspace, concepts on UAS Traffic Management (UTM), and regulatory issues.

If you are interested in leading a session or track or would like more information on the Technical Program, please contact:

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## Professional Education

The DASC will offer two full days of Professional Education sessions spanning many engineering disciplines. These tutorials will be presented by educators and practicing professionals who are recognized experts in their field. All professional education sessions will offer Continuing Education Units (CEUs) through the IEEE. For more information, please contact our Tutorial Chair.

Topics may include:

- Basic and Advanced Avionics Systems
- System Engineering
- Integrated Modular Avionics
- Space Systems
- Surveillance and Collision Avoidance
- Program Management
- Synthetic Vision
- Communications and Networks
- Navigation Systems
- Software Development, Test, and Certification (DO-178)
- Environmental Qualification (DO-160)
- System Safety
- Fault Tolerant Avionics Systems Design and Validation

**Maarten Uijt de Haag**

Ohio University  
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uijtdeha@ohiou.edu

## Sponsors and Exhibits

This year's conference will feature exhibits and product demonstrations by representatives of key avionics-related industries and institutions. To have your organization represented in our exhibit hall, please contact our Sponsors and Exhibits Chair:

**Lt Col Glen T. Logan**

LRDC Systems LLC  
(866) 648-0640  
glen.logan@comcast.net

## 2015 Integrated Communications, Navigation and Surveillance (ICNS) Conference

21-23 April 2015

Westin Washington Dulles Airport, Herndon, Virginia

### ICNS - 2015

Innovation in Operations, Implementation Benefits and Integration of the CNS Infrastructure

The ICNS Conference is an International Aviation Conference addressing technology and policy advances in ICNS - new Research, development and implementation programs and policies related to ICNS capabilities and applications, including such topics as:

- Data link Communications
- Airborne Networking
- SWIM
- Cyber Security
- Airport Surface Communications
- Aviation Spectrum
- Transition to Digital Communications
- Satellite-Based Navigation
- ADS-B
- Surveillance Systems Integration
- Avionics Equipage
- Unmanned Aircraft Integration
- Weather
- Aviation and Climate Change
- NextGen and SESAR
- New Commercial Aircraft Integration and Operation

**ICNS**  
[www.i-cns.org](http://www.i-cns.org)

Abstract Submission Date: 19 December 2014

Notification of Acceptance: 17 January 2015

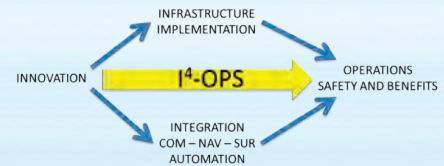
Final Paper Submission Date: 4 April 2015

Conference General Chair:

Dr. Lance Sherry  
(703) 993-1711  
lsherry@gmu.edu

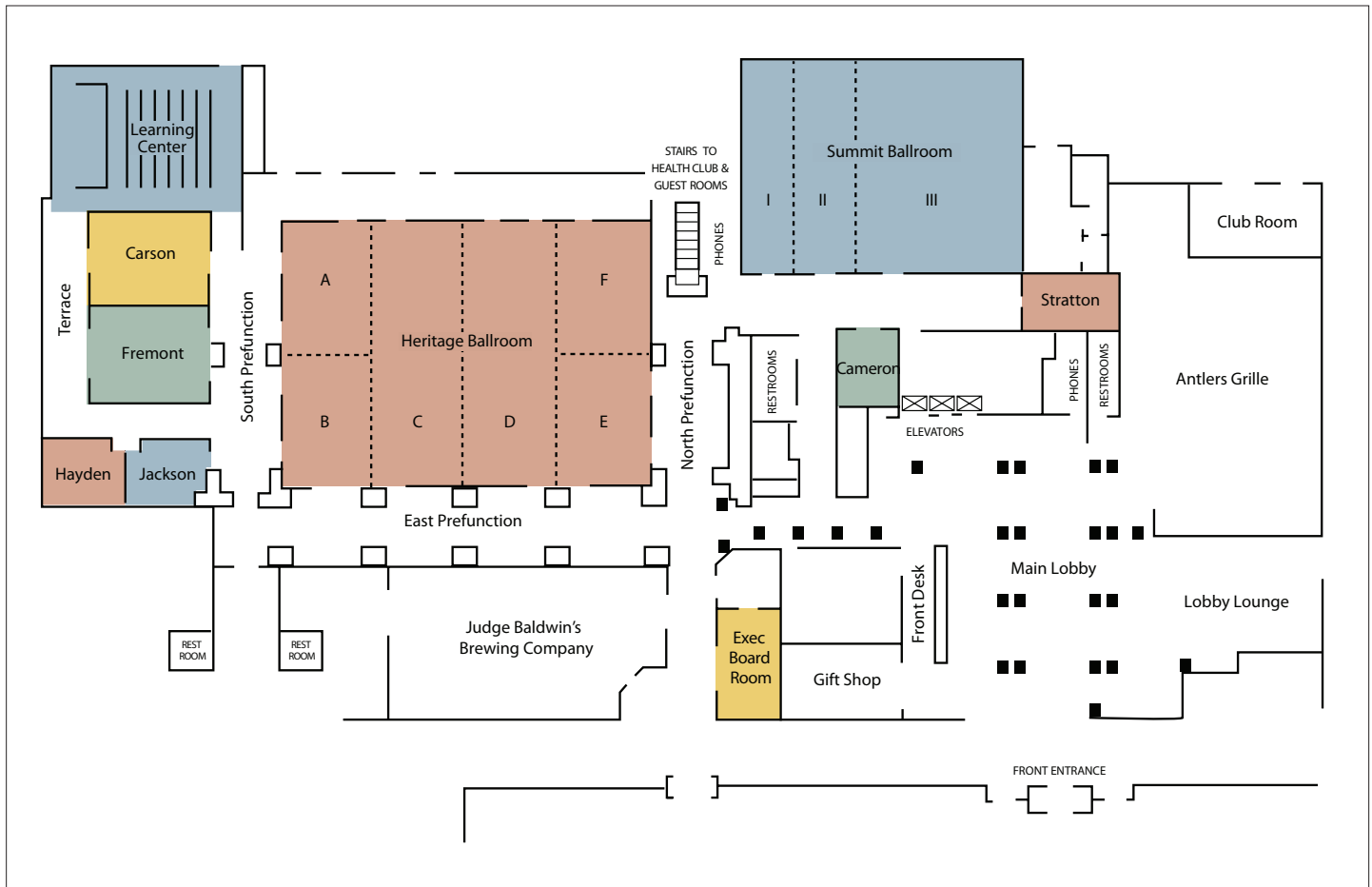
Technical Program Chair:

Dr. Michael Schnell  
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# Antlers Hilton, Colorado Springs

October 5-9, 2014





## Notes





[www.dasc.org](http://www.dasc.org)