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Welcome to the 37th Digital Avionics Systems Conference

Greetings! Welcome to the 37th International Digital Avionics Systems Conference (DASC). While the DASC is generally held in the United States of America, this is the second time it will have been held in Europe. Following the first International DASC in 2015 Prague, the conference experienced a surge in new enduring attendees from the international community including an increase in participation from major global aeronautics companies, international government research institutions and universities world-wide. We have learned of new technology development, regulatory standards and ground-breaking research from all corners of the world and beneficial collaboration across countries has increased. Having achieved and surpassed all our original objectives, the DASC Executive Committee has unanimously agreed to hold the DASC in international locations on a regular basis. Thus, I am pleased and honored to welcome you to the 37th DASC in London, the capital and most populous city of England and the United Kingdom.

The 37th DASC is sure to be stellar. I have an outstanding Conference Committee that looked into making every part of our program memorable for its attendees. This year we have new additions to our program including a day dedicated to students and several new panel discussions. My Technical Program Chair, Dr. Emmanuel Letsu-Dake of Honeywell Aerospace has put together a technical program that includes more accepted papers than the past ten-plus years. We are in a most beautiful 21st-century city with history stretching back to Roman times. A place where fairy tales are made. And, we are fortunate to have a local arrangements chair, Dr. Hugh Griffiths of University College London who has helped us tremendously with outreach to the local community. I can assure you that both the technical program and the city will live up to your expectations.

The theme of this year's conference, Intelligent Automation and Autonomy for a Safe and Secure Air Transport System was chosen to demonstrate that the DASC is looking to the future. To date innovation in aviation has focused on control of the airplane or its systems, but imagine when machine learning is paired with deep learning and neural networks to create powerful algorithms that attempt to "think" like a human. My International Co-Chair, Dr. Pavel Paces of the Czech Technical University will chair our Opening Plenary Panel devised to provide you with an overview of research efforts including technical challenges, gaps and approaches from around the world. Through your participation, you can help to influence the future directions of industry, government, and academia as we all work together to transform flight. And for those new to the field, we have our two-day tutorial program held on Sunday and Monday at Imperial College London, a University founded by Prince Albert in 1888 from surplus funds from the Great Exhibition in 1851.

Additionally, we have arranged several events for your entertainment, to meet old friends, to make new friends, and to discuss work in less formal environments. Conference attendees are invited to join us for a welcome reception on Monday late-afternoon at London Cru, an urban winery that makes critically acclaimed wines in London, with fruit grown in Europe's vineyards. Tuesday evening is your evening to explore London: sip a pint at a historic pub, take your photo with the statue of Michael Faraday and visit the observation deck of the tallest building in the European Union – The Shard. The Science Museum is open late on Wednesday evening from 18.45–22.00, and our closing event will be a Medieval Banquet plus dinner show with knights, minstrels and magicians on Thursday Evening. If you have brought a guest, please consider their joining up with other guests to take a guided day-trip to Windsor on Sunday and Hampton Court on Monday, and visit local sites such as Buckingham Palace and Westminster Abbey with our guides on Tuesday-Thursday.

Thus, on behalf of the AIAA Digital Avionics Technical Committee, the IEEE Aerospace Electronics Systems Society, the many people on the conference organizing committee and technical program committee, and the great people of London, I thank you for attending the 37th DASC and welcome you to London.

Denise Ponchak
37th DASC General Chair
NASA Glenn Research Center

Denise S. Ponchak

Conference Organizing Committee

Conference Chair:
Denise Ponchak
NASA Glenn Research Center

International Co-Chair:
Pavel Paces
Czech Technical University

Technical Program Chair:
Emmanuel Letsu-Dake
Honeywell Aerospace

Intl. Technical Program Chair:
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Technical Program Co-Chair:
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Air Force Research Lab

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Hugh Griffiths
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Awards Chair:
Chris Watkins
Gulfstream Aerospace Corporation

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Billy Barott
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University of San Diego

Student Research Competition Chair:
Miroslav Velev
Aries Design Automation

Student Research Competition Chair:
Erin Alves
Honeywell Aerospace

Conference Management:
Casey Henshaw
Conference Catalysts, LLC

Welcome to London, England, United Kingdom!

On behalf of the DASC, we welcome you to London and to the UK.

London is truly one of the great capital cities of the world. It has a wealth of history to explore: the Tower of London, the Houses of Parliament, and Hampton Court Palace, as well as numerous cultural attractions: the British Museum, the Science Museum, the Natural History Museum. The West End offers a spectacular range of shows and plays. If you can spare the time, I can recommend taking a boat trip up the River Thames to Greenwich, which offers a panoramic view over the city as well as a chance to visit the National Maritime Museum and the Royal Greenwich Observatory, which marks the zero degree Greenwich meridian.

The UK also has an enviable track record in science and engineering, and especially in avionics and aerospace. Sir Frank Whittle is credited with the invention of the jet engine in 1930. Sir Robert Watson-Watt developed an air defence system based on the Chain Home radar, which was a crucial factor in the defence of the UK in the battle of Britain in 1940. Nowadays the UK is the home of several major aerospace companies, including BAE Systems, Leonardo, and THALES.

The organizing committee has assembled an outstanding technical program of papers and presentations, highlighting technical advances in our field and providing every opportunity for the personal discussions and interactions that are so important.

Our conference committee staff welcomes you to the 37th DASC. We are certain that your visit will be a unique and stimulating experience.

Hugh Griffiths, on behalf of the Organizing Committee
37th DASC Local Arrangements Chair

Welcome to London – DASC Special Events

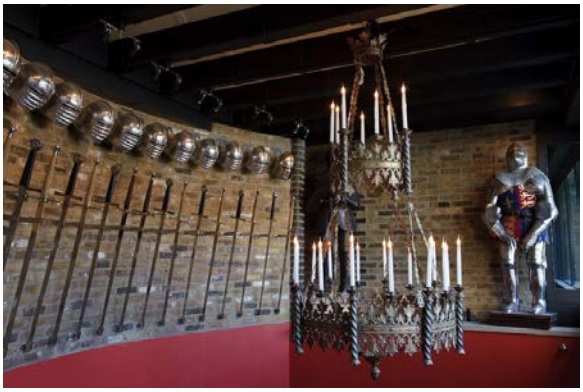
Welcome Reception
Monday, September 24, 4:00 PM – 6:00 PM
Location: London Cru Winery

Meet other DASC attendees at this evening wine tasting event preceding the technical conference sessions.

Exhibitor Reception
Tuesday, September 25, 5:30 PM – 6:30 PM
Location: Hotel Ibis London Earl's Court Hotel

Visit exhibits from various organizations and discuss relevant and emerging topics in avionics and aviation. Take advantage of this opportunity to mingle with others in your industry, meet new people and exchange fresh ideas.

Conference Special Event
Thursday, September 27
Location: Medieval Banquet
Doors open 7:15 PM
Entertainment and meal commences 7:45 PM
Entertainment finishes 10:00 PM
Disco until Midnight



This year's special event will be held Thursday evening at London's Medieval Banquet. All full conference registrations include access to the banquet and dinner. Additional guest tickets can be purchased during registration.

Awards Luncheon
Thursday, September 27 – 12:30 pm – 2:30 pm
Location: Ibis London Earl's Court Hotel

Each year, significant accomplishments of certain individuals in the field of digital avionics are recognized. We will present awards for the papers presented at the conference that were selected as Best of Track. Then we will announce the paper that was selected as Best of Conference, which is awarded the "David Lubkowski Memorial for Advancement in Digital Avionics Best Paper Award". We will also recognize the upcoming leaders in industry that won student awards.

AIAA DATC Distinguished Institution Award

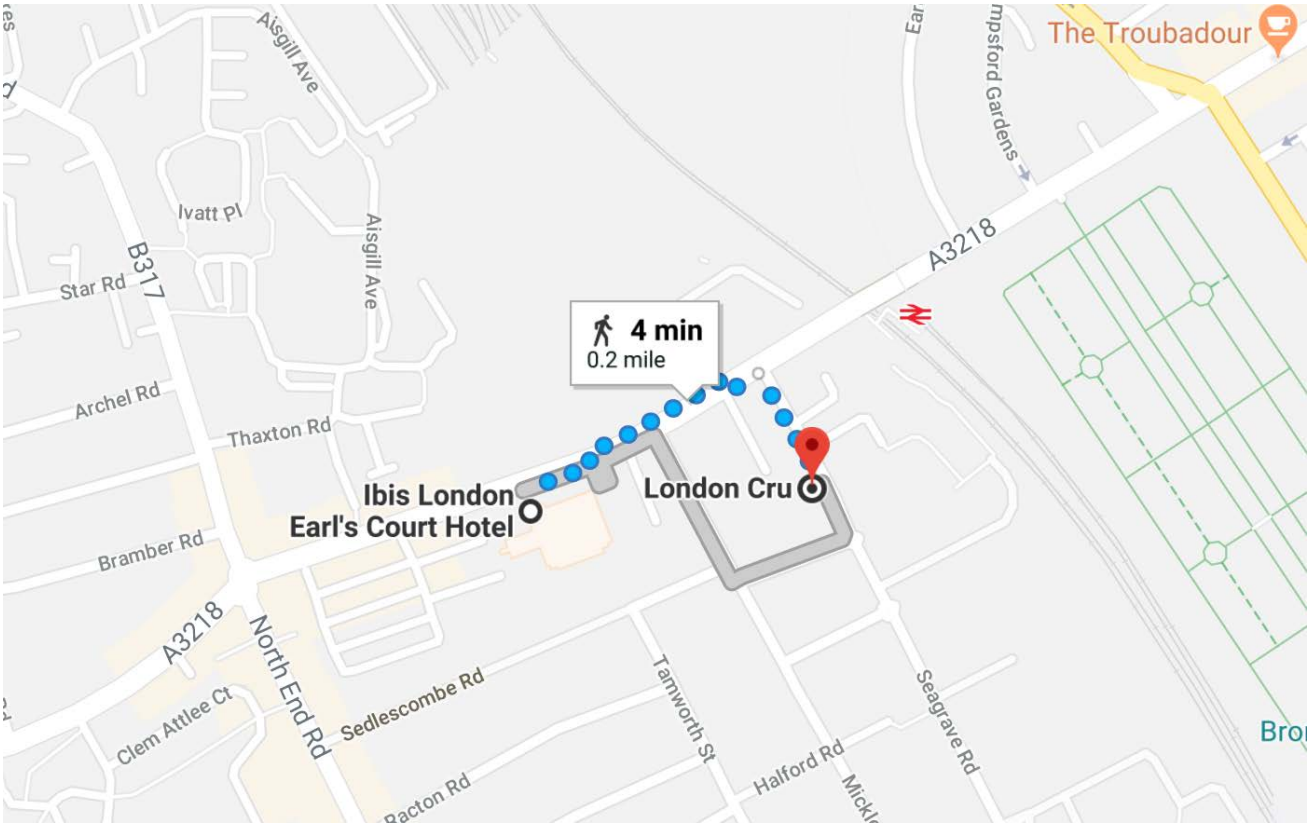
The Distinguished Institution Award is presented to an organization in recognition of outstanding achievements and invaluable contributions to the development and transfer of critical technologies that address international priorities through research, technology development, and systems integration. It is also given to recognize the organization's generous support to the success of the AIAA Digital Avionics Technical Committee (DATC); the Integrated Communications, Navigation, and Surveillance Conference (ICNS); and the Digital Avionics Systems Conference (DASC). The 2018 winner is Mosaic ATM.

David Lubkowski Memorial for Advancement in Digital Avionics Best Paper Award

The Conference Awards Chair forms a selection committee that is led by the AIAA DATC, and is responsible for selecting the David Lubkowski Memorial for Advancement in Digital Avionics Best Paper Award. The award is sponsored by MITRE/CAASD. The winner of the 37th DASC best paper award will be announced at the conference.

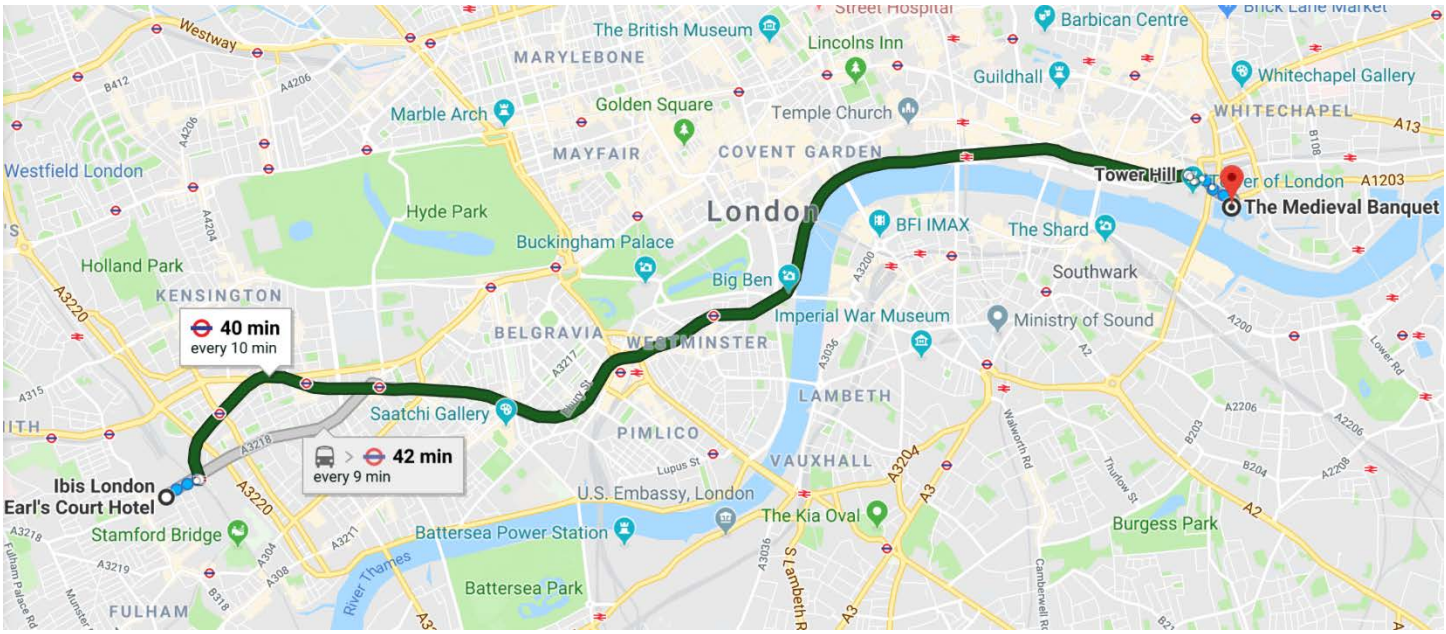
Walking directions to the London Cru Winery

from the Ibis London Earl's Court Hotel



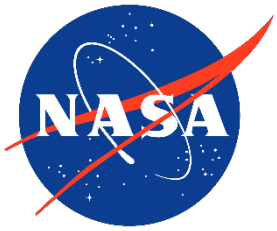
Public Transportation directions to the Medieval Banquet

from the Ibis London Earl's Court Hotel



Conference Sponsors and Co-Sponsors

Corporate Sponsors



NASA's Airspace Operations and Safety Program (AOSP) works with the Federal Aviation Administration, industry and academic partners to conceive and develop Next Generation Air Transportation System (NextGen) technologies to further improve the safety of current and future aircraft. As radar-based air traffic control transitions to a NextGen satellite-based system to enhance safety, capacity and efficiency on runways and in flight, AOSP-developed NextGen methods and means will provide advanced automated support to air navigation service providers and aircraft operators to reduce air-travel times and delays, and to ensure greater safety in all weather conditions. AOSP Projects develop and demonstrate airspace domain capabilities as foundational components of NextGen; open up the airspace to emergent users, vehicles, and missions by developing and demonstrating new service-based paradigm leveraging UTM principles; discover the impact on safety of growing complexity introduced by modernization and develop innovative solutions that mitigating these risks in accordance with target levels of safety; and, develop and validate airspace integration performance requirements to enable access to UAS in low-altitude airspace.

NASA's Unmanned Aircraft Systems Integration in the National Airspace System, or UAS in the NAS Project works on identifying, developing and testing the technologies and procedures that will make it possible for UAS to have routine access to airspace occupied by human-piloted aircraft. The UAS-NAS project uses modeling, simulations and flight tests to develop and test technologies that provide safe, effective, secure capabilities including detect and avoid (DAA) and command and control (C2). Teams of NASA researchers have been working with the UAS community since 2011 to address the technical barriers to routine UAS operations. Data results from UAS-NAS work inform the minimum operational performance standards that the Federal Aviation Administration (FAA) is using for development of technical standards and operational approval guidance. Four NASA centers support the UAS-NAS project: NASA's Ames Research Center and Armstrong Flight Research Center in California, Glenn Research Center in Ohio, and Langley Research Center in Virginia. The UAS-NAS project is within the Integrated Aviation Systems Research Program, managed by NASA's Aeronautics Research Mission Directorate at NASA Headquarters in Washington, D.C.

Boeing is the world's largest aerospace company and leading manufacturer of commercial jetliners and defense, space and security systems. As America's biggest manufacturing exporter, the company supports airlines and U.S. and allied government customers in more than 150 countries. Boeing products and tailored services include commercial and military aircraft, satellites, weapons, electronic and defense systems, launch systems, advanced information and communication systems, and performance-based logistics and training.

Boeing has a long tradition of aerospace leadership and innovation. The company continues to expand its product line and services to meet emerging customer needs. Its broad range of capabilities includes creating new, more efficient members of its commercial airplane family; designing, building and integrating military platforms and defense systems; creating advanced technology solutions; and arranging innovative customer-financing options.

Boeing's Air Traffic Management (ATM) team, with Jeppesen, a wholly-owned subsidiary, is working with government, industry and airline partners globally to improve the world's air traffic system. Boeing ATM is at the forefront of creating comprehensive solutions to airlines, airports, ANSPs and CAAs to transform the air traffic management system around the world. This transformational system relies on precision aircraft trajectories, system-wide information management architecture, network-enabled operations, and global interoperability. By applying expertise in the areas of modeling and simulation, airspace design, systems integration and navigation services, the success of a modernized and efficient air traffic management system can be realized.

The MITRE Corporation is a not-for-profit organization that provides systems engineering, research and development, and information technology support to government agencies. MITRE operates federally funded research and development centers, including the FAA's Center for Advanced Aviation System Development (CAASD), and has worked with the FAA for over 55 years. MITRE also performs ATM/CNS systems engineering for many foreign civil aviation organizations

Mentor Graphics Corporation, a Siemens business, is a world leader in electronic hardware and software design solutions, providing products, consulting services, and award-winning support for the world's most successful electronic, semiconductor, and systems companies. As DASC, Mentor will demonstrate a true Systems Engineering approach to integration, one that manages relationships between tools throughout design disciplines; coordinates changes, dependencies, and impacts; and integrates with current tools and flows...without requiring users to leave their native environments – Context® SDM.

Core Avionics & Industrial Inc. ("CoreAVI"), a Channel One company, is a global leader in providing products and services designed to enable complete solutions for safety critical applications. A supplier of real-time and safety-critical graphics and video drivers, compute drivers, "program ready" embedded graphics processors, and DO-254/ED-80 certifiable COTS hardware IP, CoreAVI's suite of products enables commercial GPUs, SoC components, and COTS hardware designs to meet the requirements of long-term high-reliability and safety-critical embedded systems with long-term support. CoreAVI's products may be purchased with certification data kits for the most stringent levels of RTCA DO-254/DO-178C and EUROCAE ED-80/ED-12C. www.coreavi.com

Since the establishment of Vector GB Ltd in 2009 the team of local specialists have supported developers and test engineers who benefit from Vector solutions developed by Vector Informatik Gmbh for aerospace electronic networking. The focus here is on tools for E/E architecture, monitoring and analysing the bus communications and on test tools in the form of a 'HIL for the developer's office desk'.

QA Systems tools automate unit testing, code coverage, integration testing and static analysis to optimise safety and business critical embedded software and accelerate standards compliance.

All our tools are independently certified by SGS TüV for use at the highest integrity level of safety related software development for all major safety standards (ISO 26262, IEC 61508, IEC 62304, EN 50128, and IEC 60880), and qualifiable for standards such as DO-178B/C.

Founded in 1996 by CEO and racing driver, Andreas Sczepansky, QA Systems operates across Europe and through a global reseller network. QA Systems has over 350 blue-chip customers, across all safety related and business critical industries. In addition to our tools, the QA Systems Academy shares our know-how and expertise with engineers from around the world.

Wind River is a global leader in delivering software for the Internet of Things. The company's technology has been powering the safest, most secure devices in world since 1981 and is found in more than 2 billion products. Wind River offers a comprehensive edge-to-cloud portfolio, supported by world-class global professional services and support and a broad partner ecosystem. Wind River software and expertise are accelerating digital transformation of critical infrastructure systems that demand the highest levels of safety, security, performance, and reliability. To learn more, visit Wind River at www.windriver.com.

Rapita Systems is the leading supplier of on-target software verification tools and services. Providing quality solutions to the global high-integrity aerospace and automotive electronics industries, we help to increase software quality, deliver evidence to meet safety and certification objectives and reduce project costs.

The Rapita Verification Suite (RVS) makes software testing more efficient and reliable. It integrates with existing development environments and offers flexible, low overhead strategies to collect verification data including unit test, structural coverage and worst-case execution time data from the most complex targets including multicore processors. RVS was designed with safety in mind and is qualifiable for use in environments such as DO-178C/ED-12C and ISO 26262.

Supporting its position as a key provider of verification solutions, Rapita Systems provides expert V&V services aimed at safety or mission-critical environments, supporting a range of activities including unit, integration, system and acceptance testing, timing analysis and optimization, compiler validation and assurance services.

Media Sponsors

NASA explores new technologies to make aircraft quieter and faster, get you gate-to-gate safely and on time, and transform aviation into a new economic engine at all altitudes.

37th DASC Week at a Glance

Sunday 9/23/2018	Monday 9/24/2018	Tuesday 9/25/2018	Wednesday 9/26/2018	Thursday 9/27/2018
7:00 am – 3:00 pm *Registration Open* ***Imperial College***	*7:00 am – 2:00 pm* *Registration Open* ***Imperial College***	*7:00 am – 4:00 pm* *Registration Open* ***ILEC Conference Centre***	*7:00 am – 4:00pm* *Registration Open* ***ILEC Conference Centre***	*7:30 am – 3:00 pm* *Registration Open* ***ILEC Conference Centre***
8:00 am – 11:00 am Tutorial: SM1, SM2 **Imperial College**	8:00 am – 11:00 am Tutorial: MM1, MM2 **Imperial College**		8:00 am – 9:30 am Panels **London III & London VII**	8:30 am – 10:00 am Technical Sessions
		8:00 am – 12:00 pm Opening Plenary Keynote and Panel **Room: London VII**	*9:30 am – 10:00 am* *Break*	*10:00 am – 10:30 am* *Break*
			10:00 am – 12:00 pm Technical Sessions and Invited Talk	10:30 am – 12:30 pm Technical Sessions
11:30 am – 2:30 pm Tutorial: SL1, SL2 **Imperial College**	11:30 am – 2:30 pm Tutorials: ML1, ML2 **Imperial College**	*12:00 pm – 1:00 pm* *Lunch* ***London IX***	*12:00 pm – 1:00 pm* *Lunch* ***London IX***	*12:30 pm – 2:30 pm* *Awards Banquet* ***London IX***
		1:00pm – 3:00pm Technical Sessions	1:00 pm – 3:00 pm Technical Sessions and Student Research Competition	2:30 pm – 4:30 pm Technical Sessions
		3:00pm –3:30pm *Break & Student Research Competition Poster Session*	*3:00 pm – 3:30 pm* *Break*	
3:00 pm – 6:00 pm Tutorials: SA2 **Imperial College**	3:00 pm – 6:00 pm Tutorials: MA1, MA2 **Imperial College**	3:30 pm – 5:30 pm Technical Sessions	3:30 pm – 5:30 pm Technical Sessions & Student Research Competition	
	4:00 pm – 6:00 pm *Welcome Reception* ***London Cru Winery*** *Registration On-Site*	*5:30 pm – 6:30 pm* *Exhibitor Reception and Student Research Competition Poster Session* ***London IX***		*7:15 pm* *Conference Special Event* ***Medieval Banquet***

Opening Keynote & Panel

Tuesday, 8:00 am

Be sure to attend the Opening Session, where a Keynote Speaker and Panelists will address the Conference Theme, "Intelligent Automation and Autonomy for a safe and secure Air Transport System."

Keynote Speaker

Prof. Guy André Boy, Ph.D.
Fellow, Air and Space Academy
President of the Science Board, ESTIA

Opening Panelists

Dr. Bernd Korn
DLR

Dr. Ratan Khatwa
Honeywell Aerospace

Dr. Pierre Andribet
EUROCONTROL

Dr. John Cavolowsky
NASA Headquarters

Dr. Chip Meserole
Boeing

Panel: Approaches to Compliance with Aviation Regulatory Documents

Wednesday, 8:00 am

Panelists

Jordan Kyriakidis,
President and CEO, QRA Corp, Halifax, Canada

Kyle Martin,
Director of European Regulatory Affairs, General Aviation Manufacturers Association (GAMA), Brussels, Belgium

Alistair Mavin,
Requirements Specialist, Rolls-Royce PLC, Derby, UK

Panel: Career Paths Outside the Box

Wednesday, 8:00 am

Organizer/Chair

Fahmida Chowdhury
Program Director, Office of International Science and Engineering (OISE), National Science Foundation (NSF)

Speakers

Tom Wang
Director, Center for Science Diplomacy, American Association for the Advancement of Science (AAAS)

Robin Grimes
Professor / Chief Scientific Advisor, Faculty of Engineering, Imperial College, London / Foreign and Commonwealth Office

Michael Dorneich
Industrial Engineering, Iowa State University, IA, USA

Kathleen Kramer
Electrical Engineering, University of San Diego, CA, US

Invited Talk: Understanding the Process of Writing Papers for IEEE Publications

Wednesday, 10:00 am – 11:00 am

George Ponchak
Senior Research Engineer, NASA Glenn Research Center

Speaker Bio

George E. Ponchak received the B. E. E. degree from Cleveland State University, Cleveland, OH in 1983, the M.S.E.E. degree from Case Western Reserve University, Cleveland, OH in 1987, and the Ph.D. in electrical engineering from the University of Michigan, Ann Arbor, MI in 1997.

He joined the staff of the Communications, Instrumentation, and Controls Division at NASA Glenn Research Center, Cleveland, OH in 1983 where he is now a senior research engineer. In 1997-1998 and in 2000-2001, he was a visiting professor at Case Western Reserve University in Cleveland, OH. He has authored and co-authored 200 papers in refereed journals and symposia proceedings.

Dr. Ponchak is a Fellow of the IEEE. Dr. Ponchak was the Editor-in-Chief of the IEEE Transactions Microwave Theory and Techniques from 2010-2013 and the Editor-in-Chief of the IEEE Microwave and Wireless Components Letters from 2006-2009. He has served on the Editorial Board of the International Journal of RF and Microwave Computer Aided Engineering since 2005. He received the 2014 N. Walter Cox Award that recognizes an IEEE MTT-S member who has given exemplary service to the Society and the Best Paper of the ISHM'97 30th International Symposium on Microelectronics Award.

Cary R. Spitzer Professional Education Program

Professional Education Chair
Billy Barott
Embry-Riddle Aeronautical University

It is my pleasure to welcome you to the Cary R. Spitzer Professional Educational Program for the 37th 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 supporting this year's theme in Intelligent Automation and Autonomy for a safe and secure Air Transport System.

This year we are offering 11 tutorials split across two days, in two parallel tracks. Most courses have been selected to directly complement the topics that will be presented in the technical program, ranging from autonomous vehicles, navigation, avionics systems, and architectures – to design assurance and cyber-security. Some of these courses directly address our theme of the conference.

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 attendee's. 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 (0.3 CEUs per course). In short, no matter what your educational goals are, the professional development program of the 37th 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 37th DASC. See you in London!

Sunday, September 23			**Monday, September 24**		
8:00 – 11:00	11:30am – 2:30pm	3:00pm – 6:00pm	8:00am – 11:00am	11:30am – 2:30pm	3:00pm – 6:00pm
Exploring Multicore in an ARINC 653 Environment: A Hands-On Tutorial using Simics and VxWorks 653 Edition	Spacecraft Avionics Systems Engineering Fundamentals		Hardware Design Assurance: DO-254 and the Accompanying Regulatory Interpretations	Approaches to Software Design Assurance for Avionics and Flight Controls: DO-178C and Beyond (Part 1)	Approaches to Software Design Assurance for Avionics and Flight Controls: DO-178C and Beyond (Part 2)
SM1: Deiber and Charrier	SL1: Andrew		MM1: Ferrell	ML1: Ferrell	MA1: Ferrell
Avionics Systems ARP4754A	Aviation Safety and Security Guidelines	Reliable Navigation for Unmanned Aircraft Systems (UAS)	Introduction to Formal Methods using RTCA DO-178C	Performance Based Navigation for Aviation: RNP, SBAS, and GBAS	Modern Avionics Architectures
SM2: Hilderman	SL2: Kornecki	SA2: Uijt de Haag	MM2: Joyce and Kyriakidis	ML2: Dautermann	MA2: Etherington

Tutorial Descriptions

Sunday, September 23rd

Session 1

SM1: Exploring Multicore in an ARINC 653 Environment: A Hands-On Tutorial using Simics and VxWorks 653 Edition

Patrick Deiber and Oliver Charrier, Wind River

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

SL1: Spacecraft Avionics Systems Engineering Fundamentals

George Andrew, GNA Aerospace Consulting Group

This course offers a detailed look at basic spacecraft avionics systems engineering and design processes and principals. All spacecraft avionics systems have similarities, but differ in many ways. This course addresses the up-front systems engineering process; requirement levels, trade studies, requirements allocation/linking requirements derivation, requirements verification, risk and risk assessment, safety, integration and test, costing, scheduling, and then applying all this to the avionics subsystem level design on a subsystem-by-subsystem basis. Attendees will be exposed to avionics subsystem designs that are typically used on satellite buses and will learn the terms, nomenclature and rules of thumb used in the development process. Each avionics subsystem is explained in detail to gain insight into manpower and cost requirements. In addition to spacecraft avionics equipment, the design, fabrication, and qualification of the electrical ground support equipment required for satellites are discussed in detail.

Sunday, September 23rd

Session 2

SM2: Avionics Systems ARP4754A

Vance Hilderman, Afuzion

SAE-ARP4754A provides guidance for the development of aircraft and aircraft systems while taking into account the overall aircraft operating environment and functions. ARP4754 was long "suggested" for commercial avionics; the new ARP4754A is now required and increasingly mandatory for all avionics including worldwide militaries and UAV's beginning as early as 2017. ARP-754A is commonly called "DO-178 for Aviation Systems", but it's really much different: ARP4754A requires detailed Safety processes (ARP4761) and data, systems-level planning, traceability, V&V and tight configuration management. While bearing some semblance to DO-178, ARP4754A really covers the Avionics Development Ecosystem and is a mandatory foundation – it must come BEFORE DO-178C. The processes for developing systems requirements are rigorous and formal processes must be proven in place before software and hardware development begin.

This tutorial will cover a selection of topics relating to ARP4754A, such as:

- How ARP4754A fits into the Avionics Development Ecosystem including ARP4761A, DO-178C, and DO-254
- Differences between ARP4754 and ARP4754A
- ARP4754A Planning – what is really required
- Aviation Safety: what is required for ARP4754A
- Handling Derived and Safety Requirements per ARP4754A
- System Requirements – What, Where, Why, and How
- Planning, Development, and Traceability Processes for Systems
- ARP4754A Documentation
- ARP4754A Verification & Validation
- ARP4754A Best Practices & Common Mistakes

Attendees may include systems or safety engineers, managers, software/hardware engineers, quality assurance or certification personnel; no prior expertise required.

SL2: Aviation Safety and Security Guidelines

Andrew Kornecki, Embry-Riddle Aeronautical University

This three-hour tutorial provides participants with basic understanding of safety and security concepts when specifying, designing, testing, and maintaining a software product as a component of a safety critical system in aviation industry. The participants are exposed to the issues related to safety and security of software intensive systems. Systems dependability aspects such as safety, security and reliability are discussed with their relations and interactions. Issues of software assurance, system airworthiness, and certification including applicable industry standards are discussed. Special attention is paid to the aviation industry guidance and certification aspects as mandated by the governmental bodies and supported by the RTCA and EUROCAE elaborated in their respective documents.

SA2: Reliable Navigation for Unmanned Aircraft Systems (UAS)

Maarten Uijt de Haag, Ohio University

This course provides a fundamental background in assured navigation for unmanned aircraft systems (UAS). It first introduces the various UAS/RPAS application domains and operational environments, UAS flight management and path planning, required performance parameters, and autonomy at the various levels of the Guidance, Navigation and Control function. Furthermore, it addresses the foundations of Global Navigation Satellite Systems (GNSS) and inertial navigation and discusses the challenges of operating in the various target environments with sole-means GNSS. Next, augmentation methods and alternative navigation methods will be discussed with a focus on guaranteeing required navigation performance in, especially, GNSS-challenged environments. Finally, the course will

talk about the role of the navigation function in surveillance, geo-fencing and relative navigation in case of swarms of UAS.

Monday, September 24th

Session 1

MM1: Hardware Design Assurance: DO-254 and the Accompanying Regulatory Interpretations

Tom Ferrell, Ferrell & Associates Consulting

RTCA DO-254/ED-80 (Design Assurance Guidance for Airborne Electronic Hardware) has been with us for eighteen years but its application is still not universal. While its use to assure FPGA and ASIC development are well accepted, its broader application at the circuit-card assembly and LRU level is now challenging traditional hardware development methods. With no update cycle in sight, both the FAA and EASA have put out rather divergent guidance on how best to demonstrate compliance for airborne electronic hardware that continues to increase in complexity.

This fast-paced tutorial will cover all of the basics of DO-254 content with an emphasis on successful compliance demonstration. The various required data items will be discussed along how best to approach Appendix B for higher criticality hardware. Specific technical challenges such as single event effects, the treatment of COTS (both components and intellectual property), and the relationship to other design aspects (systems, software, environmental) will all be covered. The course will also review the key topics arising from the varying guidance from the FAA (FAA Order 8110.105A) and EASA (CM SWCEH-001), as well as the harmonization efforts currently underway. This tutorial will conclude with a discussion of the biggest challenges and pitfalls in DO-254 and how to successfully address them.

ML1: Approaches to Software Design Assurance for Avionics and Flight Controls: DO-178C and Beyond (Part 1)

Tom Ferrell, Ferrell & Associates Consulting

DO-178C/ED-12C and its predecessors have reigned at the top of the software design assurance pyramid for more than twenty-five years. At this point, compliance to DO-178C is simply expected for all software on commercial transport aircraft. However, with recent changes at the FAA to reorganize their software guidance and shift to a more risk-based approach for compliance oversight, this is no longer strictly the case for general aviation. There are also alternatives to the DO-178C prescriptive process assurance being explored by the FAA. Such approaches will be crucial to ensuring autonomous aircraft can move forward given their reliance on machine learning and other forms of artificial intelligence.

As in years past, this tutorial will provide the student with a fast-paced introduction to software design assurance and will cover DO-178C in its entirety. In doing so, emphasis will be given to the underlying core principles that any well-engineered avionics or flight control system should possess. The first session will address how software design assurance relates to the broader concepts or system safety and the current certification framework. Part 1 will also provide complete coverage of the objectives, activities, and data associated with the typical life cycle phases of planning, requirements, and design. We will look at the impacts of various technologies and methods as we go including the relevant aspects of both the technical supplements (DO-331, DO-332, and DO-333) and other guidance and guidelines (FAA Orders, EASA certification memos). Finally, we will look at what the new guidelines originating out of ASTM and are domain guidelines (e.g., ISO 26262) have to say about design assurance that could be relevant for your UAS work.

MA1: Approaches to Software Design Assurance for Avionics and Flight Controls: DO-178C and Beyond (Part 2)

Tom Ferrell, Ferrell & Associates Consulting

DO-178C/ED-12C and its predecessors have reigned at the top of the software design assurance pyramid for more than twenty-five years. At this point, compliance to DO-178C is simply expected for all software on commercial transport aircraft. However, with recent changes at the FAA to reorganize their software guidance and shift to a more risk-based approach for compliance oversight, this is no longer strictly the case for general aviation. There are also alternatives to the DO-178C prescriptive process assurance being explored by the FAA. Such approaches will be crucial to ensuring autonomous aircraft can move forward given their reliance on machine learning and other forms of artificial intelligence.

Our fast-paced introduction to software design assurance continues in this second part of this tutorial where our focus will be on DO-178's expectations and content concerning software verification, configuration management, quality assurance, and tool qualification (DO-330) will take center stage. We will discuss methods for completing required review and analysis activities, as well as the various approaches to software testing. As was done in part 1, the associated objectives, activities, and data will be covered, along with some possible alternative approaches. Relevant FAA and EASA guidance will be presented. We will conclude this second part with an overview of the FAA's initiative to define 'Overarching Properties' that has the potential to make way for innovative approaches to design assurance, not only for software but for other aspects of the design as well.

Monday, September 24th

Session 2

MM2: Introduction to Formal Methods using RTCA DO-178C

Jeffrey Joyce, Critical Systems Labs and Jordan Kyriakidis, QRA Corp

This tutorial provides an introduction to the practical use of formal (mathematical) methods in the development of airborne software. Formal methods can be used to find defects and other problems in software life cycle data that might be very difficult to find using conventional approaches, such as review and test. Participants will learn how formal

methods can be selectively applied in the software life cycle to produce certification data in compliance with RTCA DO 178C/ EUROCAE ED 12C. Several illustrative examples will be presented with enough detail that participants should be able to later repeat the examples on their own using open source software tools. Some of these examples will demonstrate how functional requirements expressed in Natural Language can be translated into formal representations suitable for analysis. Other examples will demonstrate how formal analysis can be used in the context of model-based development to find defects in models of varying complexity. Participants will learn about the currently available tools and will see hands-on how to use the QVtrace formal design verification tool and its QCT formal language in some of these examples. The tutorial will also provide an overview of the formal methods supplement RTCA DO-333, which provides specific guidance for the use of formal methods towards earning RTCA DO 178C/ EUROCAE ED 12C certification credit.

ML2: Performance Based Navigation for Aviation: RNP, SBAS, and GBAS

Thomas Dautermann, German Aerospace Center DLR

This tutorial will cover several aspects of the Performance Based Navigation (PBN) concept as set forth by ICAO. First, we investigate the requirements described by relevant annexes to the convention of Chicago and the PBN manual ICAO Doc 9613. Next, we quickly recapitulate the principles of GNSS operation and receiver autonomous integrity monitoring (RAIM), which is required for the PBN implementation called required navigation performance or short RNP. Within RNP, the tutorial covers also RNP AR and the new advanced RNP concept.

From an entirely aircraft based navigation solution, we progress to augmentation systems such as provided via satellite link (such as the WAAS and EGNOS system) or ground stations (called GBAS or LAAS). For each of those systems the tutorial covers the principles of operation, computation of the augmented position solution and their implementation in operational use and associated benefits.

MA2: Modern Avionics Architectures

Tim Etherington, Rockwell Collins

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, military and civilian
- Federated and integrated designs with emphasis on modern commercial and military aircraft
- 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 and the impact on future designs

Technical Program

Technical Program Chair:
Emmanuel Letsu-Dake
Honeywell Aerospace

International Technical Program Chair:
Erik Theunissen
Netherlands Defence Academy

Technical Program Co-Chair:
Erik Blasch
Air Force Research Lab

Greetings: The 37th meeting of the DASC will continue in the rich profile of a preeminent aviation industry conference by focusing on avionics, communication, navigation and surveillance hardware and software systems, as well as air traffic management and human factors in aviation. This year's conference theme is "Intelligent Automation and Autonomy for a safe and secure Air Transport System." The technical sessions of the conference will address challenges in this area, as intelligent systems are being gradually introduced into the air transport system with safety and criticality implications. Technical presentations and posters will cover diverse perspectives dissecting the underlying capabilities, dependencies and implementations of intelligent systems in aerospace to better understand issues and opportunities.

Technical Sessions: The technical sessions include over 200 technical presentations scheduled Tuesday, September 25th through Thursday, September 27th. The sessions are organized into 8 tracks: Air Traffic Management (ATM), Communication, Navigation, and Surveillance (CNS) Systems, Unmanned Aircraft Systems (UAS), Integrated Modular Avionics (IMA), Human Factors, Cyber/Systems/Software Engineering, Autonomous Systems and Special Topics. In addition, a poster track is provided to allow one-on-one interaction with authors on all conference topics.

Conference Proceedings Download Link: The 37th DASC will provide a download link to the conference proceedings that will include the full technical manuscripts.

The entire Technical Program Committee comprising my Co-Chairs, Track Chairs and Co-Chairs, Session Chairs and Co-Chairs appreciate your participation in the 37th meeting of DASC. We are proud to welcome you to London, U.K, which has one of the greatest concentrations of cultural attractions in the world and symbolizes the international constitution of the DASC. We hope you will explore and enjoy the city. We encourage you to learn from and engage in discussions with aerospace industry, government, and academic researchers and practitioners forging the future of aviation. Feel free to reach out to your session chair, track chair or Conference Organizers with any questions or comments. Thank you in advance for your interest and involvement in the future of avionics and air traffic management.

37th DASC Conference Tracks:

Air Transportation Management (ATM)
Track Chairs: Enrique Casado and Jason Glaneuski

Communications, Navigation and Surveillance (CNS)
Track Chair: Rafael Apaza

Unattended Aircraft Systems (UAS)
Track Chairs: Bernd Korn and Brandon Suarez

Integrated Modular Avionics (IMA)
Track Chairs: Steve VanderLeest and Laurence Mutuel

Human Factors (HF)
Track Chairs: Michael Dorneich and Tim Etherington

Cyber, Systems, and Software (CSS)
Track Chairs: Ivan Martinovic and Krishna Sampigethaya

Special Topics (ST)
Track Chairs: Khanh Pham

Autonomous Systems
Track Chairs: Yemaya Bourdain and Florian Adolf

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.

Technical Program Schedule

Tuesday, September 25

This year's theme is "Intelligent Automation and Autonomy for a safe and secure Air Transport System." Any questions about the technical program should be directed to the Technical Program Chairs, Emmanuel Letsu-Dake, Erik Theunissen, and Erik Blasch. The following schedule, dates, and times are subject to change.

Date / Time	Room: London I	Room: London II	Room: London III	Room: London IV	Room: London V	Room: London VI	Room: London VII
Sept. 25 1:00 pm – 3:00 pm	**Autonomous Systems A**	**CSS A** Aircraft Cyber Security	**IMA A** Architecture (including Multicore)	**UAS A** UAS Technology - 3	**Human Factors A** Cognitive Assistants	**CNS A** Surveillance	**ATM A** Advanced ATM Capabilities
Sept. 25 3:30 pm – 5:30 pm	**Autonomous Systems B**	**CSS B** Aircraft Cyber Security - II	**IMA B** Networks	**UAS B** Detect and Avoid	**Human Factors B** Future Operations	**CNS B** Communications Systems	**ATM B** Aircraft Performance

Student Research Competition Poster Session

The Student Research Competition poster session will take place on Tuesday, September 25 from 3:00 PM – 3:30 PM and 5:30 PM – 6:30 PM.

Technical Program Schedule

Wednesday, September 26

Date / Time	Room: London I	Room: London II	Room: London III	Room: London IV	Room: London V	Room: London VI	Room: London VII
Sept. 26 10:00 am – 12:00 pm	**ATM C** Airspace Management	**CSS C** Avionics Design, Development, and Certification	**ATM N** Special Topics -1	**UAS C** UAS Technology - 1	**Special Topics A** Emerging Sensors and Systems for Autonomous Vehicles	**CNS C** Communications Technologies	
Sept. 26 1:00 pm – 3:00 pm	**ATM H** Machine Learning in ATM	**Special Topics B** Human Factors & Performance for Aerospace Applications	**IMA C** V&V, Assurance / Safety / Certification, Test, Simulation	**UAS D** UAS Technology - 2	**Human Factors C** Advanced Aviation Displays	**CNS D** Networks and Systems	**ATM I** Weather Impact Assessment
Sept. 26 3:30 pm – 5:30 pm	**ATM E** Automation	**Special Topics C** In Situ Awareness & Enabling Technologies for Safe Aerospace Operations	**IMA D** Config, Spec, Model	**UAS E** Detect and Avoid -2	**Human Factors D** Pilot Displays to Improve Awareness	**CNS E** Navigation	**ATM J** Performance Assessment

Student Research Competition Formal Presentations

The Student Research Competition final round will take place on Wednesday, September 26, from 1:00 pm to 5:30 pm in Hyde Park Suite.

Technical Program Schedule

Thursday, September 27

Date / Time	Room: London I	Room: London II	Room: London III	Room: London IV	Room: London V	Room: London VI	Room: London VII
Sept. 27 8:30 am – 10:00 am	**ATM F** Departure & Arrival Management	AESS Cyber Security Panel/Committee		**UAS F** Public Acceptance and Risk assessment	**Human Factors E** Air Traffic Control & Flight Planning	**CNS G** CNS Special Topics	**ATM D** Analytics
Sept. 27 10:30 am – 12:30 pm	**ATM G** Leveraging ATM Data	**CSS D** Model-based approaches in aviation	**Special Topics D** Geolocation and Registration	**UAS G** UAS Traffic Management & Airspace Integration	**Human Factors F** Advanced Controls	**CNS F** Navigation Sytems	**ATM L** TMA Operations
Sept. 27 2:30 pm – 4:30 pm	**ATM K** Simulation & Modeling		**ATM O** Special Topics -2	**UAS H** Detect and Avoid -3	**Special Topics E** Communication Systems & Technologies for Challenged Environments		**ATM M** Trajectory Prediction & Management

Technical Sessions

Tuesday, September 25, 1:00 PM – 3:00 PM

	1:00	1:30	2:00	2:30
Autonomous Systems A Session Chair: Florian Adolf London I	Levels of Aviation Autonomy Eric Anderson *Rockwell Collins*	A Risk Based Assessment of a small UAS Cargo Delivery Operation in Proximity to Urban Areas Evan Dill *NASA*	Highly Flexible Swarm Intelligence Algorithm for Resilient Autonomous Systems Massood Towhidnejad *Embry-Riddle Aeronautical University*	Self-training by reinforcement learning for full-autonomous drones of the future Kjell Kersandt *UPC BarcelonaTECH*
CSS A *Aircraft Cyber Security* Session Chair: Vincent Lenders London II	Airborne Crowdsensing Networks: Safe and Secure Aircraft-Based Observations Brandon Burfeind *Air Force Institute of Technology*	Data Flow Guard for Aircraft Intra-Domain Secure Communication Mohammed Waheed *AVIAGE Systems*	In-Flight Aircraft Smart Space Security using Multi-Entity Trust Evaluations Paul Seymer *George Mason University*	Aircraft Mass Estimation using Quick Access Recorder Data Fang He *Shanghai Jiao Tong University*
IMA A *Architecture (including Multicore)* Session Chairs: Laurence Mutuel and Harold Tiedeman London III	Enabling correct I/O sharing in the combinatorial optimization of large avionics systems Björn Annighöfer *University of Stuttgart*	A Verification Algorithm for the Automatic Topology Discovery of the Adaptive Avionics Platform Bernd Schulz *University of Stuttgart*	An Integrated User Applications Simulation Environment for ARINC 661 Server Test Weidong Yang *Fudan University* Xi Shen *Fudan University* Kejia Yang *University of Michigan*	A Framework for Analyzing Shared Resource Interference in a Multicore System Steven VanderLeest *DornerWorks, Ltd.*
UAS A *UAS Technology - 3* Session Chair: Cesar Munoz London IV	Direct adaptive backstepping flight control for quadcopter trajectory tracking Hakim Bouadi *Ecole Militaire Polytechnique*	A New Graph-Based Flight Planning Algorithm for Unmanned Aircraft System Traffic Management Sangjun Bae *Cranfield University*	Generating Representative Small UAS Trajectories using Open Source Data Andrew Weinert *MIT Lincoln Laboratory*	Why Unmanned Aircraft Systems (UAS) make the Perfect Systems Engineering System David Maroney *Queen's University Belfast*
Human Factors A *Cognitive Assistants* Session Chair: Jan Boril London V	Principles for Minimizing Cognitive Assistance Distraction in the Cockpit Steven Estes *MITRE*	Preliminary Guidelines for Human-Agent Teams in Space Operations Beyond Low-Earth Orbit Güliz Tokadlı *Iowa State University*	Enhancing Cognitive Assistants with Low-Cost Computer Vision Joseph Menzenski *MITRE*	
CNS A *Surveillance* Session Chair: Santi Ibarz London VI	ADS-B degarbling and jamming mitigation by the use of Blind Source Separation Mauro Leonardi *University of Rome Tor Vergata*	Secondary Surveillance Radar Enhanced by OAM Wave with Azimuth Estimation Capability Dong Chen *Tsinghua University*	Integrated Communication Waveform Design for Bistatic Radar Dong Chen *Tsinghua University*	A Research and Implementation on Real Time Tracking for Abnormal Flight using ACARS Xiaoguang Lu *Tianjin Key Lab of Advanced Signal Processing* Zhe Zhang *Civil Aviation University of China*
ATM A *Advanced ATM Capabilities* Session Chair: Dylan Hasson London VII	eVTOL Arrival Sequencing and Scheduling for On-Demand Urban Air Mobility Imke Kleinbekman *Delft University of Technology*	Concept of Operations for Advanced Interval Management Applications in an Arrival Metering Environment William Penhallegon *The MITRE Corporation*	Simulation of inter-airport relations using a system-of-systems model Alexander Gillissen *German Aerospace Center (DLR)*	Validating a European ATM Security System Architecture Michael Finke *German Aerospace Center (DLR)*

Technical Sessions

Tuesday, September 25, 3:30 PM – 5:30 PM

	3:30	4:00	4:30	5:00	
Autonomous Systems B Session Chair: Yemaya Bordain London I	Flight autonomy Impact to future avionics architecture Joe Yin *Aviage Systems*	An Independent Configurable Architecture for Reliable Operations of Unmanned Systems Maria Consiglio *NASA Langley Research Center*	Consideration of Airborne Detection System for DAA Technology in Remote Pilot Aircraft Systems Jaehyun Lee *Korea Advanced Institute of Science and Technology*	A Framework for Automatic Coordination of Request-Oriented Deployment of Multi-UAV with Cost Optimization André B. Leal *Universidade do Estado de Santa Catarina*	Intelligent Autonomy for Aerospace Engineering Systems Carlos C. Insaurralde *University of the West of England*
CSS B *Aircarft Cyber Security - II* Session Chair: Hartmut Hintze London II	A Safety-focused Security Risk Assessment of Commercial Aircraft Avionics Luke Ryon *Rockwell Collins*	The Risk Matrix as an integral part of a SysML-based Security Engineering Approach in the Development of Complex Aircraft Cabin Systems Hartmut Hintze *Hamburg University of Technology*	Safety Critical Software and Security - How Low Can You Go? Karin Bernsmed *SINTEF Digital*	A Certificateless Group Authenticated Key Agreement Protocol for Secure Communication in Untrusted UAV Networks Benjamin Semal *Royal Holloway University of London*	Design of a novel network intrusion detection system for drone communications Ruohao Zhang *ENAC* Nicolas Larrieu *ENAC*
IMA B *Networks* Session Chairs: Andrew Bellis and Marc Gatti London III	Quantitative Analysis of ARINC-653 Scheduling Overheads on Multi-Core Systems Hyun-Chul Jo *Konkuk University*	Implementation of a SPI based Redundancy Network for SoC based UAV FCCs and Achieving Synchronization Sebastian Hiergeist *Technische Hochschule Ingolstadt*	Comparison of Time Sensitive Networking (TSN) and TTEthernet Lin Zhao *Beihang University*	A new approach to the productivity of MBSE development through integrated access to knowledge Bill Chown *INCOSE & Mentor Graphics*	
UAS B *Detect and Avoid* Session Chair: Steven Young London IV	Aircraft Proximity: a synthesis of Apollonius, X-track, and Well Clear Volume paradigms Neale L Fulton *University of New South Wales*	Application of "Well Clear" to Small Drones Niklas Peinecke *German Aerospace Center*	Sensor Uncertainty Mitigation and Dynamic Well Clear Volumes in DAIDALUS Cesar Munoz *NASA*		
Human Factors B *Future Operations* Session Chairs: Lynda Kramer and Güliz **Tokadlı** London V	Role of the human operator in future commercial Reduced Crew Operations Sebastian Sprengart *Technische Universität Darmstadt*	Urban Air Traffic Management (UTM) Implementation In Cities - Sampled Side-Effects Jonas Lundberg *Linköping University* Billy Josefsson *Air Navigation Services of Sweden, LFV*	Single Pilot Operations with AR-Glasses using Microsoft HoloLens Ferdinand Behrend *Technical University of Berlin & Institute of Aeronautics*	User-centered Integration of Automated Air Mobility into Urban Transportation Networks Thomas Otte *RWTH Aachen University*	
CNS B *Communications Systems* Session Chair: Santi Ibarz London VI	Hyper-Spectral Communications, Networking & ATM: Progress and Perspectives David W Matolak *University of South Carolina*	Demonstration of an Integrated 5G Network in an Aircraft Cabin Environment Dominic A. Schupke *Airbus*	An Implementation Analysis of Communications, Navigation, and Surveillance (CNS) Technologies for Unmanned Air Systems (UAS) Fred Templin *Boeing Research and Technology*	A Fault Tolerant Software Defined Networking Architecture for Integrated Modular Avionics Ibrahim Hokelek *TUBITAK BILGEM*	
ATM B *Aircraft Performance* Session Chair: Sergio Torres London VII	A Model of Fuel Consumption Estimation and Abnormality Detection based on Airplane Flight Data Analysis Zhen Pan *Key Laboratory of Avionics System Integration*	Evaluation of the Applicability of a Modern Aircraft Performance Model to Trajectory Optimization Javier Lopez Leones *Boeing Research and Technology Europe*	A Model for Estimation of Fuel Consumption during Aircraft Taxi Operations Eun-Mi Oh *Korea Aerospace Research Institute*	BADA Family H - A Simple Helicopter Performance Model for ATM Applications Vincent Mouillet *Eurocontrol*	Viability of the Use of Aircraft-generated Intent Data for Air Traffic Management Gregory Saccone *The Boeing Company*

Technical Sessions

Wednesday, September 26, 10:00 AM – 12:00 PM

	10:00	10:30	11:00	11:30	
ATM C *Airspace Management* Session Chair: Yoon Jung London I	Optimal Aircraft Rerouting during Space Launches using Adaptive Spatial Discretization Rachael E Tompa *Stanford University*	Airspace Crossing Optimization by Direct Route Assignments Andrea Pasini *(Universite de Toulouse ISAE*	Multiagent Reinforcement Learning Methods for Resolving Demand - Capacity Imbalances George Vouros *University of Piraeus*	Synchronization of Traffic Flow and Sector Opening for Collaborative Demand and Capacity Balancing Xavier Prats *Technical University of Catalonia*	
CSS C *Avionics design, development, and certification* Session Chair: Martin Strohmeier London II	Mindful Application of Standards for Avionics - An intentional, systematic, and measurable transformation Uma Ferrell *The MITRE Corporation*	A probably heretical look at some of the problems with the conceptual basis for low level and derived requirements, followed by a ray of hope Matt Jaffe *Embry-Riddle Aeronautical University*	Object Oriented Checkers as a First Step Towards Coverage Driven Verification in DO-254 Design Assurance Paul Williams *Mentor Graphics a Siemens Business*	Tailoring Traditional Software Life Cycles to Ensure Compliance of RTCA DO-178C and DO-331 with Model-Driven Design Johnny Marques *Aeronautics Institute of Technology*	
ATM N **Special Topics - 1** Session Chair: Daniel Finkelsztein London III	An Interacting Multiple Model based Aircraft Trajectory Conformance Prediction Method Wang Zhuojia *Beihang University*	Discussion on Density-Based Clustering Methods Applied for Automated Identification of Airspace Flows Christian Eduardo Verdonk Gallego *Universidad Politecnica de Madrid & Cranfield University*	Data mining and Machine Learning techniques supporting Time-Based Separation concept deployment Ivan De Visscher *Wake Prediction Technologies (WaPT)*	Data Lake Architecture for Air Traffic Management Daniel Finkelsztein *SGT Inc.*	Airbus 320 AND 737NG Performance Differences in Advanced RNP to XLS Arrivals Thomas Dautermann *German Aerospace Center (DLR)*
UAS C *UAS Technology – 1* Session Chair: Adan Vela London IV	Safeguard - Flight Test Results of an On-board System Designed to Assure Conformance to Geospatial Limitations Evan Dill *NASA*	In-Time Safety Assurance Systems for Emerging Autonomous Flight Operations Steven Young *NASA Langley Research Center*	Adaptive Augmentation of an Unmanned Aerial Vehicle's Flight Control System Jan Vlk *Brno University of Technology.*	System Autonomy for Space Traffic Management Sreeja Nag *NASA Ames Research Center*	Adaptation for Evidence Accrual Applied to UAS Impact Assessment Kathleen A Kramer *University of San Diego*
Special Topics A *Emerging Sensors and Systems for Autonomous Vehicles* Session Chair: Pavel Paces London V	Emergency Landing Field Recognition Based on Elevation Data Using Parallel Processing Felix Eckstein *University of Hagen*	Airport Runway Area Detection Based on Multi - Feature Optimization in PolSAR Images Qingyan Shi *Civil Aviation University of China*	Wind-Aware Trajectory Planning for Fixed-Wing Aircraft in Loss of Thrust Emergencies Carlos Varela *RPI*	Trajectory Optimization with Discrete Decisions William Barott *Embry-Riddle Aeronautical University*	
CNS C *Communications Technologies* Session Chair: David Matolak London VI	An Efficient Precoder Structure for Dual Satellite Systems for Ubiquitous Communication Sirigina Rajendra Prasad *Nanyang Technological University*	In-Flight Performance Analysis of a Wideband Radio Using SDR for Avionic Applications Joe Zambrano *LASSENA Labs, École de Technologie Supérieure*	Design approach of a future air-to-air data link Miguel Angel Bellido-Manganell *German Aerospace Center (DLR)*	High-Frequency Band Automatic Mode Recognition using Deep Learning Zhengjia Xu *Cranfield University*	

Technical Sessions

Wednesday, September 26, 1:00 PM – 3:00 PM

	1:00	1:30	2:00	2:30
ATM H *Machine Learning in ATM* Session Chair: Sarasina Tuchen London I	Machine learning techniques for taxi-out time prediction with a macroscopic network topology Jianan Yin ***Nanjing University of Aeronautics and Astronautics***	Large Scale Adaptive 4D trajectory Planning Pierre Dieumegard ***French Civil Aviation University***	A Novel Predictability Performance Metric and Its Forecast Using Machine Learning Techniques Rocio Barragan Montes ***Universidad Politecnica de Madrid***	Critical Flight Trajectory Identification via Machine Learning for Large-scale Trajectory Management Yue Li ***Beihang University***
Special Topics B *Human Factors & Performance for Aerospace Applications* Session Chair: Rachael Tompa London II	Semi-supervised Adaptation of Assistant Based Speech Recognition Models for different Approach Areas Hartmut Helmke ***German Aerospace Center (DLR)***	Classification and Review of Conceptual Frameworks for commercial Single Pilot Operations Stefan Neis ***Technische Universität Darmstadt***	Using Machine Learning to Improve Regulatory Review of Flight Waivers and Exemptions Carlos Martinez ***The MITRE Corporation***	Reduced Crew Operations Matthew Carrico ***Rockwell Collins***
IMA C *V&V, assurance / safety / certification, test, simulation* Session Chairs: Shana Fliginger and Martin Halle London III	Research on Safety Analysis Method of Functional Integrated Avionics Systems Yuqian Wu ***Shanghai Jiao Tong University.***	A demonstrator for the verification of the selective integration of the Flexible Platform approach into Integrated Modular Avionics Darbaz Nawzad Darwesh ***University of Stuttgart***	An Efficient Approach for Monitoring and Analyzing Real-Time ARINC 661 Events Weidong Yang ***Fudan University*** Qicheng Qiu ***Fudan University***	Experimental Allocation of Safety-Critical Applications on Reconfigurable Multi-Core Architecture Louis Sutter ***Georgia Institute of Technology***
UAS D *UAS Technology - 2* Session Chairs: Thomas Dautermann and Bernd Korn London IV	Datalink System Maturation and Flight Testing of the Sagitta UAS Demonstrator Andreas Zeitler ***Airbus Defence & Space***	DME/DME based navigation for GNSS interference mitigation: Simulation, Algorithms Mustafa Tekin ***TAI***	Understanding Vertical Collision Risk and Navigation Performance for Unmanned Aircraft Integration and Management Aaron McFadyen ***Queensland University of Technology***	Assured UAS Navigation with Airborne Laser Range Scanners for Various Phases of Flight Maarten Uijt de Haag ***Ohio University***
Human Factors C *Advanced Aviation Displays* Session Chairs: Carlo Tiana and Audrey Reinert London V	Enhanced Functions for a Parallel Multicore Ground Proximity Warning System David Müller ***German Aerospace Center (DLR)***	Development of Pilot Display for Parabolic Flight Experiment Kohei Funabiki ***Japan Aerospace Exploration Agency***	Impact of Advanced Synoptics and Simplified Checklists during Aircraft Systems Failures Lynda J Kramer ***NASA***	
CNS D *Networks and Systems* Session Chair: David Matolak London VI	Heterogeneous Aeronautical Communications Network with Interference-Aware Detectors Sirigina Rajendra Prasad ***Nanyang Technological University***	A SDN-based Aeronautical Communications Network Architecture Yim-Fun Hu ***University of Bradford***	Transmitting GBAS messages via LDACS Nils Mäurer ***German Aerospace Center (DLR)***	Feasibility of power supply over CAN bus: Study on different elementary design aspects Alvaro Llaria ***ESTIA***
ATM I *Weather Impact Assessment* Session Chair: Rosa Rodriguez London VII	Wake Vortex Hazards in En-Route Airspace and Suspected Hazard Area Identification Using High Fidelity Simulation Models Marc Melgosa ***Technical University of Catalonia***	Integration of Digital Weather and Air Traffic Data for NextGen Rao Madhavrao ***MIT Lincoln Laboratory***		

Technical Sessions

Wednesday, September 26, 3:30 PM – 5:30 PM

	3:30	4:00	4:00	4:30
ATM E *Automation* Session Chair: Marc Bourgois London I	Software Challenges of a Web-based Air Traffic Control Training Tool Mohammad Moallemi *Embry-Riddle Aeronautical University*	High Performance Robotic Computing as an enabler for cooperative flights Leonardo Camargo Forero *Universitat Politécnica de Catalunya*	Evolution of Electronic Approval Request Procedures at Charlotte Douglas International Airport Lindsay Stevens *NASA Ames Research Center*	Assessment of Risks and Benefits of Context-Adaptive Augmented Reality for Aerodrome Control Towers Hejar Guerluek *German Aerospace Center (DLR)*
Special Topics C *In Situ Awareness & Enabling Technologies for Safe Aerospace Operations* Session Chair: Erik Blasch London II	An Adaptive Online Learning Model for Flight Data Cluster Analysis Weizun Zhao *City University of Hong Kong*	Assurance Case to Structure COTS Hardware Component Assurance for Safety-Critical Avionics Andreas Schwierz *Technische Hochschule Ingolstadt*	Applying a single source of truth approach to the information needed for Functional Safety Bill Chown *Mentor Graphics*	Knowledge Discovery for Avionics Maintenance Support Luis Palacios Medinacelli *Thales Research & Technology*
IMA D *Config, Spec, Model* Session Chairs: Björn Annighöfer and Larry Kinnan London III	A novel approach for the development and coding of avionics functionalities for IMA architectures Luca Garbarino *CIRA*	Model-Based specification of Integrated Modular Avionics systems using Object-Process Methodology Humberto Luiz Valdivia de Matos *EMBRAER*	A time synchronization protocol for A664-P7 Safouan Taha *Universite Paris Saclay*	A Service Provisioning Layer Enabling Simplex-minded Function Development on Integrated Modular Avionics Hardware Bastian Luettig *University of Stuttgart*
UAS E *Detect and Avoid - 2* Session Chair: Evan Dill London IV	Collision Avoidance for Unmanned Aerial Vehicles using Simultaneous Game Theory Francesco d'Apolito *AIT Austrian Institute of Technology*	An Evaluation of Alert Thresholds for Detect and Avoid in Terminal Operations Michael Vincent *NASA Langley Research Center*	Perspectives and Sensing Concepts for Small UAS Sense and Avoid Domenico Accardo *Università degli Studi di Napoli FEDERICO II*	Well Clear: Conflict prediction and alerting in the terminal environment Eric Theunissen *Netherlands Defence Academy*
Human Factors D *Pilot Displays to Improve Awareness* Session Chairs: **Güliz Tokadlı** and Audrey Reinert London V	A prototype of Enhanced Synthetic Vision System using short-wave infrared Yue Cheng *AVIC Computing Technique Research Institute*	Survey of Spatial Disorientation and Sensory Illusion among Air Force Pilots Jan Boril *University of Defence.*	Concepts for a Condition-Based Attention Control on Helicopter Navigation Displays Enhancing Situational Awareness during Helicopter Missions Paul Frost *Technische Universität Braunschweig*	
CNS E *Navigation* Session Chair: Rainer Koelle London VI	Flight Management System Pathfinding Algorithm for Automatic Vertical Trajectory Generation Ramon Andreu Altava *ENAC*	DME/DME/ADAHRS Positioning Using a Particle Filter Pavel Dycka *University of Defence*	Simulations investigating curved departure and arrival procedures using GNSS based vertical guidance Ferdinand Behrend *Technical University of Berlin*	Research on the Dynamic CDA track optimization based on the optimal trajectory points selection Fengxun Gong *Civil Aviation University of China*
ATM J *Performance assessment* Session Chair: Xavier Prats London VII	AIRPORTS Metrics: A Big Data application for computing flights' performance indexes based on flown trajectories Fernando Díaz *Universidad de Valladolid*	Performance Assessment of European Air Navigation Service Providers Thomas Standfuss *DLR German Aerospace Center*	An Airliner Fleet Planning and Airway Allocation Algorithm under Carbon Emission Constraint Zhiyuan Shen *Nanjing University of Aeronautics and Astronautics*	Performance Evaluation of Conflict-Free Trajectory Taxiing in Airport Ramp Area Using Fast-Time Simulations Nikolai Okuniek *German Aerospace Center (DLR)* Yoon Jung *NASA Ames Resaerch Center*

Technical Sessions

Thursday, September 27, 8:30 AM – 10:00 AM

	8:30	9:00	9:30	
ATM F *Departure & Arrival Management* Session Chairs: Jean Boucquey and Mark Strout London I	Dynamic runway configurations and flexible arrival/departure tradeoffs in metroplex airports Jianan Yin *Nanjing University of Aeronautics and Astronautics*	Operational Impact of the Baseline Integrated Arrival, Departure, and Surface System Field Demonstration Shivanjli Sharma *NASA Ames Research Center*	Capacity-Driven Automatic Design of Dynamic Aircraft Arrival Routes Tatiana Polishchuk *Linköping University*	
UAS F *Public Acceptance and Risk assessment* Session Chair: Maarten Uijt de Haag London IV	Giving the public a perspective into UAS operations Lynne Martin *NASA Ames Research Center*	Towards a Rigorous Basis for Specific Operations Risk Assessment of UAS Ganesh J. Pai *NASA Ames Research Center*	A Safety Analysis of UAV Mapping Operations Adan E Vela *University of Central Florida*	
Human Factors E *Air Traffic Control & Flight Planning* Session Chairs: Steven Estes and Priyank Pradeep London V	Comparison of Air Traffic Controller Display Techniques for Reaching Target Times at Significant Waypoints Oliver Ohneiser *German Aerospace Center (DLR)*	Ontology for Transcription of ATC Speech Commands of SESAR 2020 solution PJ.16-04 Hartmut Helmke *German Aerospace Center (DLR)*	Factors for Pilot's Decision Making Process to Avoid Severe Weather during Enroute and Approach Marco-Michael Temme *German Aerospace Center (DLR)*	
CNS G *CNS Special Topics* Session Chair: Rafael Apaza London VI	Detection of Clear Air Turbulence by Airborne Weather Radar using RR-MWF Method Renbiao Wu *Civil Aviation University of China* Xiaoguang Lu *Tianjin Key Lab of Advanced Signal Processing*	Feasibility of Machine Learning Methods for Predictive Alerting of the Energy State for Aircraft Maarten Uijt de Haag *Ohio University*	Flight Parout: A simulation platform for intelligent flight path reroutes for adverse weather Babatope S. Ayo *University of Bradford*	The way to the future has already started: ICAO Aeronautical Telecommunication Network (ATN) using Internet Protocol Suite (IPS) Standards and Protocol evolution update Rafael Apaza *NASA Glenn Research Center*
ATM D *Analytics* Session Chair: Pablo Costas London VII	Advanced Flight Efficiency Key Performance Indicators to support Air Traffic Analytics: Assessment of European flight efficiency using ADS-B data Javier Lopez Leones *Boeing Research and Technology Europe*	A Data-Driven Fuel Consumption Estimation Model for Airspace Redesign Analysis Ning Hong *City University of Hong Kong*	The Trade-off Between Trajectory Predictability and Potential Fuel Savings for Continuous Descent Operations Yuyang Jia *Beihang University*	

Technical Sessions

Thursday, September 27, 10:30 AM – 12:30 PM

	10:30	11:00	11:30	12:00	
ATM G *Leveraging ATM Data* Session Chair: Jason Glaneuski London I	Real-time Identification of Guidance Modes in Aircraft Descents Using Surveillace Data Ramon Dalmau *Technical University of Catalonia (UPC)*	Analysis of ADS-B Trajectories in the Republic of Korea with DAA Well Clear Metrics Hyeonwoong Lee *Inha University & Aerospace Control & System Lab.*	Data-driven Aircraft Trajectory Predictions using Ensemble Meta-Estimators Andres Munoz Hernandez *Mission Consultancy Assistance Engineering*	Identifying Factors Influencing RNAV STAR Adherence Using Aviation Data Michael Stewart *SJSU Foundation (NASA)*	
CSS D *Model-based approaches in aviation* Session Chairs: Uma Ferrell and Jan Leuchter London II	A STAMP based Method to Synthesize Controller of Safety-Critical Systems Bráulio Horta *Instituto Tecnológico de Aeronáutica*	PHYLOG: a model-based certification framework Claire Pagetti *ONERA*	Informal Formal Design Verification: Experience from the Industrial Trenches Jordan Kyriakidis *QRA Corp*	A General Model Based Engineering Approach To MRO Business Software Applications Using Acme Hassan Reza *University of North Dakota*	
Special Topics D *Geolocation and Registration* Session Chair: Rachel Tompa London III	High Precision Positioning Method for Searching Airborne Black Boxes Underwater Based on Acoustic Oribtal Angular Momentum Chao Zhang *Tsinghua University*	Efficient Hemisphere Unambiguous Magnetic Positioning Algorithm for Electromagnetic Helmet Mounted Sights Chao Zhang *Tsinghua University*	Aircraft Detection Based on Eigen Decomposition and Scattering Similarity for PolSAR Image Ping Han *Civil Aviation University of China*		
UAS G *UAS Traffic Management & Airspace Integration* Session Chair: Alexander Kuenz London IV	Using Segmented Standard Taxi Routes to Integrate Unmanned Aircraft Systems at Civil Airports Michael Finke *German Aerospace Center (DLR)*	Determining maximum airspace capacity via simulation Audrey Reinert *Purdue University*	Hybrid-Duplex based Control and Non-Payload Communication Systems for UAVs: An Outage Analysis Sirigina Rajendra Prasad *Nanyang Technological University*	Extending ADS-B for Mixed Urban Air Traffic Thabet Kacem *University of the District of Columbia*	Density based management concept for urban air traffic Bernd Korn *German Aerospace Center (DLR)*
Human Factors F *Advanced Controls* Session Chairs: Peggy Wu and Carlo Tiana London V	Development of Touchscreen Displays for the Gulfstream G500 and G600 Symmetry™ Flight Deck Colleen Nilson *Gulfstream Aerospace Corporation*	Motion Simulator Evaluation of a Flight Deck Cursor Control Device (CCD) Emmanuel Letsu-Dake *Honeywell Aerospace*	Evaluation of a multi-modal interface for pilot interaction with avionic systems Jason Gauci *University of Malta*	Investigating the Usability of Touchscreens in a Turbulent Flight Deck Mark Smith *GE Aviation Systems*	
CNS F *Navigation Sytems* Session Chair: Carlos Insaurralde London VI	Integrity Monitoring of BDS/INS Loosely Integrated System Using Multiple Kalman Filters Giuseppe Battista *Deutsches Zentrum für Luft- und Raumfahrt & German Aerospace Center*	The use of airport lighting systems in instrument part of approaching manoeuvre Alicia Fernandes *Mosaic ATMs*	Advanced Low-Cost Integrated Inertial Systems with Multiple Consumer Grade Sensors Jingyang Lu *Virginia Commonwealth University*	OpenSky Report 2018: Assessing the Integrity of Crowdsourced Mode S and ADS-B Data Martin Strohmeier *University of Oxford*	
ATM L *TMA Operations* Session Chair: Enrique Casado London VII	Fast sensitivity-based optimal trajectory updates for descent operations subject to time constraints Ramon Dalmau *Technical University of Catalonia (UPC)*	Heuristic Approach for Arrival Sequencing and Scheduling for eVTOL Aircraft in On-Demand Urban Air Mobility Priyank Pradeep *Iowa State University*	Optimal assignment of 4D close-loop instructions to enable CDOs in dense TMAs Raúl Sáez *Technical University of Catalonia (UPC)*	A New Multiple Flights Routing and Scheduling Algorithm in Terminal Manoeuvring Area Sangjun Bae *Cranfield University*	

Technical Sessions

Thursday, September 27, 2:30 PM – 4:30 PM

	2:30	3:00	3:30	4:00
ATM K *Simulation & Modeling* Session Chair: Chris Brinton London I	Centralized Disaggregate Stochastic Allocation Models for Collaborative Trajectory Options Program (CTOP) Guodong Zhu *Iowa State Univerisity*	Evaluation of Multiple Flow Constrained Area Capacity Setting Methods for Collaborative Trajectory Options Program Gita Hodell *SJSURF/NASA Ames Research Center*	Real-time Prediction of Aircraft Boarding Stefan Reitmann *German Aerospace Center (DLR)*	Simulation-based Benefits and Costs Assessment of NASA's Airspace Technology Demonstration-2 Aditya Saraf *ATAC Corporation*
ATM O *Special Topics - 2* Session Chairs: Sarasina Tuchen and Yoon Jung London III	World-Wide Air Traffic: Route-based versus Direct Alexander Kuenz *German Aerospace Center (DLR)*	Use of an aircraft monitoring system for Condition Assessment of a maneuvering area Ludek Cicmanec *University of Defense Brno*	Coordinated Trajectory Management for Integrated Control of Airport and Airspace Operations Xavier Prats *QRA Corp*	The Role of Aviation in Seamless End to End Mobility Sarasina Tuchen *United States Department of Transportation & Volpe National Transportation Systems Center*
UAS H *Detect and Avoid - 3* Session Chair: Niklas Peinecke London IV	Surrogate-Based Optimization for Radar Surveillance Requirements to Support RWC and CA for Unmanned Aircraft Jessica Lopez *Johns Hopkins University Applied Physics Laboratory*	Advances in the Use of NAS Infrastructure and GBDAA for UAS Operations Robert J Stamm *Raytheon Company & Intelligance, Information and Services*	Airspace Risk Management for UAVs: A Framework for Optimising Detector Performance Standards and Airspace Traffic using JARUS SORA Zi Huang *Nova Systems Australia*	
Special Topics E *Communication Systems & Technologies for Challenged Environments* Session Chair: Hartmut Helmke London V	Resource allocation in beam hopping communication system Lixin Zhang *Beihang University*	Resilient Networking Framework for Mission Operations and Resource Sharing in Multi-Agent Systems Christopher Manderino *University of Pittsburgh & SHREC - NSF Center for Space*	Overview of Silicon Carbide Power Devices for Aircraft Electrical Systems Jan Leuchter *University of Defence*	A Cybersecurity Architecture for the L-band Digital Aeronautical Communications System (LDACS) Nils Mäurer *German Aerospace Center (DLR)*
ATM M *Trajectory Prediction & Management* Session Chairs: Enrique Casado London VII	Flight Planning Under Trajectory-Based Operations Stephane Mondoloni *MITRE Corporation*	Study of a complete free route implementation in the European airspace Cesar Nava Gaxiola *Technical University of Catalunya*	Evaluation of Numerical Methods for Aircraft Trajectory Computation Sergio Torres *Leidos*	Resolving a Dilemma: Guaranteeing Conflict-free 4D-Trajectories While Leaving Autonomy to Airlines Cody Fleming *University of Virginia*

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38th DASC

Digital Avionics Systems Conference

San Diego, California, USA | September 8-12, 2019

CALL FOR PAPERS

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Honeywell Aerospace Advanced Technology

Tech Program Chair
Mr. Rafael Apaza
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Ms. Casey Henshaw
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Important Dates

SUBMISSION DEADLINES

March 1, 2019
Abstract Submission

March 22, 2019
Notification of Acceptance

May 17, 2019
Full Paper Submission Deadline
(If Editorial Review is requested)

July 12, 2018
Final Paper Submission Deadline

CONFERENCE DATES

Hilton San Diego Resort & Spa

September 8-9, 2019
Tutorials

September 10-12, 2019
Conference

Please join us in sunny San Diego, California for the 38th AIAA/IEEE Digital Avionics Systems Conference (DASC), the preeminent R&D Conference in the field of digital avionics offered by its two most distinguished professional societies, the Digital Avionics Technical Committee (DATC) of the American Institute of Aeronautics and Astronautics (AIAA) and the Aerospace and Electronic Systems Society (AESS) of the Institute of Electrical and Electronics Engineers (IEEE).

In addition to having near perfect weather year-round, San Diego offers plenty of educational, cultural and recreational opportunities for everyone to explore around the conference. Venture out to Balboa Park for an evening enrichment, enjoy gaslight dinners at the historic downtown, winddown at the beaches along 70 miles of spectacular coastline or have a family outing at the world-famous zoo. We are positive that you will have a memorable and educational experience at the 38th DASC.

CONFERENCE THEME

UTM to ATM Airspace Integration – role of Spectrum, AI, machine learning and automation

Artificial Intelligence (AI) and machine learning are transformational for the commercial and the consumer industries. Drones and ground vehicles are relying more and more on sensor data fusion with AI to improve safety. The focus of the 38th DASC will be to explore how AI and machine learning can be applied effectively to various aspects of Air Traffic Management (ATM) to improve safety, capacity and performance. Participants are invited to submit cutting edge research papers and exchange diverse perspectives on application of AI and machine learning to address modern challenges of UAS integration into ATM airspace, dynamic spectrum operations, advanced CNS automation, cognitive pilot/controller interactions, cyber security, etc. Original research on technical challenges, gaps and approaches to enhance traditional ATM, UTM, CNS, IMA, space systems, software and human factors are invited.

Areas of emphasis will include:

- ATM/UTM decision-making using AI and machine learning.
- Urban Air Mobility (UAM) ATM concepts and CNS technology enablers
- Dynamic sectors and cognitive radio to reduce spectrum demand and improve operational efficiency.
- Adaptive, integrated secure networks – use of deep learning in cyber security
- Cognitive assistants, Digital Copilots and Robotic Copilot to reduce workload, augment performance and improve safety.
- Safety assurance and human factors.
- Integration of autonomous vehicles into the airspace.
- Multi-modal interaction including speech recognition and synthesis for cockpit and Air Traffic Management.

Other Topics

The 38th DASC will continue to offer opportunities to publish and present on a wide range of topics of interest to the avionics technology community (see next page).

Papers, Panels, Education and Workshops

The Technical and Professional Education Programs will incorporate technical research papers and relevant tutorials from international Researchers, Innovators, Engineers, Users, and Designers. Plenary panel discussions and keynote presentations by Leaders in Industry, Government and Academia will discuss topics that are shaping international developments. Please check our website for periodic updates: **http://www.dasconline.org**.

AIAA The World's Forum for Aerospace Leadership

DATC AIAA Digital Avionics Technical Committee

IEEE Advancing Technology for Humanity

AESS

38th DASC Digital Avionics Systems Conference

DASC 2019 TECHNICAL PROGRAM

Air Traffic Management (ATM) Machine Learning & Automation

Application of AI and machine learning to leverage distributed knowledgebase, fusion of sensor data from multiple airborne and ground systems to address ATM challenges; predictive automation aids to reduce controller and pilot workload.

ATM – Airspace & Spectrum management

Automation and cognitive radios to support dynamic sectors and mitigate escalating spectrum demand; Traffic flow management; spacing, sequencing, and scheduling; command and control technologies for future ATM; separation management; unmanned aircraft system traffic management (UTM) inspired air traffic management for new entrants; simulation and modeling needs.

Unmanned Aircraft Systems (UAS)

Issues, challenges, and opportunities arising from emerging drone and autonomy technology developments; UAS system design, applications, and mission optimization. Of significant interest are concepts for integrating UAS into both controlled and uncontrolled airspace.

Communications, Navigation, and Surveillance and Information Networks (CNS)

Role of machine learning and AI in navigation, and surveillance; distributed knowledgebase enabled by broadband communications; n-board and ground-based CNS systems for all vehicles and services. Emerging fields include: surface wireless networks; air/ground datalink; satellite-based CNS; optical communications; global navigation satellite systems (GNSS); alternative positioning navigation and timing (APNT); performance-based navigation; and, surveillance systems for ATM and collision avoidance; self-forming / healing networks; quality of service (QoS) driven software defined networks.

Cyber, Systems, and Software (CSS) Impact of "Connected"

Design, testing, verification and validation, and certification of large complex aviation systems with multiple design assurance levels; avionics cyber security; cyber-physical security threat assessment and mitigation development; airborne network security and risk; software assurance versus regular security patches. Multiple Independent Levels of ecurity afety (MILS) physical and virtual system firewalls; AI-based deep packet inspection; data security for shared data buses; operating system security; virtual versus physical domain separation.

Integrated Modular Avionics (IMA)

System resources and performance allocation, configuration, integration, verification and certification processes and tools; model-based system engineering; scalability; inter-partition interference on multicore processors; assessing system demand and resource availability; mitigation of common mode failures; system maintenance; wired and wireless communication; health monitoring; optimization techniques architectures including open interface standards; operating systems; ARINC-653; alternate API solutions, communication standards, use of Commercial-Off-The-Shelf (COTS) technologies; modularity vs. scalability.

Human Factors (HF)

Issues on human interaction with automation such as mode awareness, trust in automation, roles and responsibilities, flight deck displays and controls, and decision support tools ssessment and modeling of human performance; methods for avoiding the presentation of hazardously misleading information; information abstraction and conveyance concepts that enable appropriate levels of workload and crew coordination.

Special Topics (ST)

Includes topics that do not fit the above areas or are recently emerging from new technical innovations, such as but not limited to: emerging systems architectures; safety-critical avionics; mission planning, and operations; risk management methods; computer aided design; space systems.

PROFESSIONAL EDUCATION

DASC will offer two days of Professional Education sessions spanning relevant engineering disciplines. These tutorials will be presented by educators and practicing professionals who are recognized experts in their field.

Examples of possible topics include:

- Basic & Advanced Avionics Systems; Integrated Modular Avionics
- Surveillance & Collision Avoidance; Synthetic Vision; Sensing Modalities
- Navigation Systems ncluding echnologies and Performance Based Navigation
- Communications Systems and Networks
- Systems Engineering; Program Management
- Software Development & Test Certification (DO-178)
- Environmental Qualification (DO-160)
- System Safety
- Cyber Security
- Autonomy & Application of Modern Techniques to Autonomous Systems

All professional education sessions will offer Continuing Education Units (CEUs) through the IEEE. For more information, contact our Professional Education Chair.

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 via the conference website.

For inquiries regarding paper submissions, please contact:

Casey Henshaw
Conference Catalysts
chenshaw@conferencecatalysts.com

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IEEE Advancing Technology for Humanity

AESS

ICNS CONFERENCE

CALL FOR TECHNICAL PAPERS & PRESENTATIONS

ICNS2019: Enabling Future Flight through Evolving ICNS Technologies

CONFERENCE DATES

9-11 April 2019

CONFERENCE VENUE

Westin Washington Dulles Hotel

Herndon, Virginia, USA

IMPORTANT DATES

- **Abstract submission**
  14 December 2018
- **Notification of Acceptance**
  11 January 2019
- **Final Papers due**
  15 February 2019

ORGANISERS

- **Conference General Chair**
  Dr Nikos Fistas, EUROCONTROL
- **Technical Program Chair**
  Dr Jonathan Lee, U.S. DOT Volpe Center
- **Sponsors and Exhibits Chair**
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Contact information can be found at: https://i-cns.org/

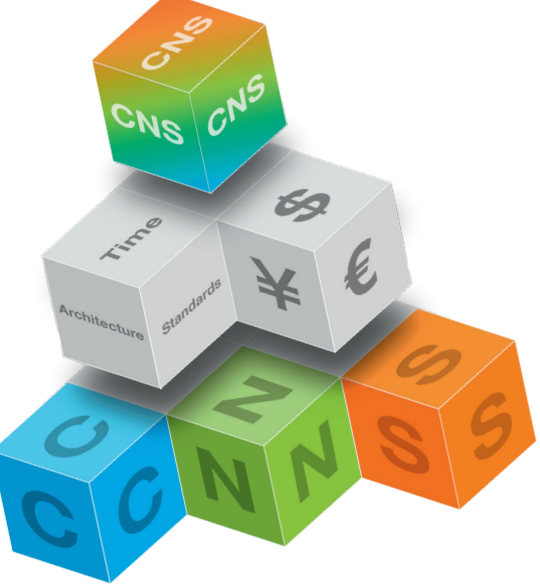
The Integrated Communications Navigation and Surveillance (ICNS) Conference is the premier international aviation conference addressing technology and policy advances in CNS research, development and implementation programs and policies related to CNS/ATM capabilities and applications. ICNS is a not-for-profit event, jointly organised by the American Institute of Aeronautics and Astronautics (AIAA) Digital Avionics Technical Committee (DATC) and the Institute of Electrical and Electronics Engineers (IEEE) Aerospace and Electronic Systems Society (AESS), with active support from government and industry. The ICNS Conference assembles leaders from government, industry and academia as well as senior technical experts to address important policy issues and discuss the future directions.

The ICNS Conference provides an excellent framework for networking during breaks and evening social events, which provide an opportunity for an enhanced, efficient and informal exchange of views among policy makers and researchers.

The 2019 ICNS Conference theme will be "Enabling Future Flight through Evolving ICNS technologies". The 2019 Conference will focus on and address the impact of the evolving technologies and CNS research technology developments on aviation concepts. Terrestrial and satellite based CNS capabilities are available to support 4D Trajectory Based Operations (TBO), the increased automation requirements of future flight, as well as the rapidly emerging UAS operations and their needs. The 2019 Conference will address these integrated CNS technologies as well as the spectrum on which they all depend. The 2019 ICNS Conference will be a three day event. Each day of the conference begins with a morning plenary session addressing a hot topic of global relevance. Distinguished invited speakers will set the stage for the policy, economic, operational and technology aspects of the plenary. The morning plenary is followed in the afternoon by a number of parallel technical discussions with selected papers and presentations on various CNS themes. The technical papers and presentations are exploring recent developments in technology and system design characterizations that address and complement the plenary topics.

The conference provides an understanding of all major CNS/ATM programs and addresses implementation strategies, standards development, research, ICNS technologies and the relationship between next generation air traffic management and the enabling communications, navigation and surveillance infrastructure that will build the bridge between CNS and ATM.

AIAA DATC IEEE AESS NASA FAA EUROCONTROL



19th Integrated Communication Navigations and Surveillance Conference

9-11 April 2019

Westin Washington Dulles Hotel
Herndon, Virginia, USA

Visit us at: i-cns.org

Plenary Sessions and Interactive Workshop

Tuesday, 9 April: Plenary: *Global Harmonization*

Wednesday, 10 April and Thursday 11 April: *Plenary and Workshop topics will be defined at a later stage*

Afternoon Technical Sessions

Papers and presentations are solicited for the technical sessions, addressing the key topical areas listed below:

- Data and Voice Communications Systems
- Surveillance Systems & Situational Awareness
- Navigation Systems & APNT
- CNS Integration, Consolidation and Miniaturization
- Drivers for CNS Evolution
- Cybersecurity
- Integration of UAV, RPAS, and Space Transportation Into the Airspace
- UAS Traffic Management (UTM)
- Commercial, Military, and Consumer UAS
- Air Traffic Management (ATM) and Supporting Technologies
- Performance-based CNS/ATM
- Airport & Airspace Optimization/Operations
- Support for Civil Military Interoperability
- Impact of Climate Change and Aviation Weather on Aviation and CNS Performance
- Changing Economic Impact on Users and Purchasers and Users of CNS Equipment
- Emerging Aviation Systems
- CNS Spectrum Aspects
- Artificial Intelligence Developments and Impacts to CNS/ATM

Sponsors and Exhibits

ICNS 2019 invites industry sponsors and exhibits and product demonstrations by representatives of CNS-related industries and organizations. Participating as an exhibitor in the conference allows close-up interaction with customers and key policy decision makers to help move your research and products closer to daily operations. For more information, please contact the 2019 Sponsors and Exhibits Chair Paul Kostek, sponsor.exhibits.chair@i-cns.org.

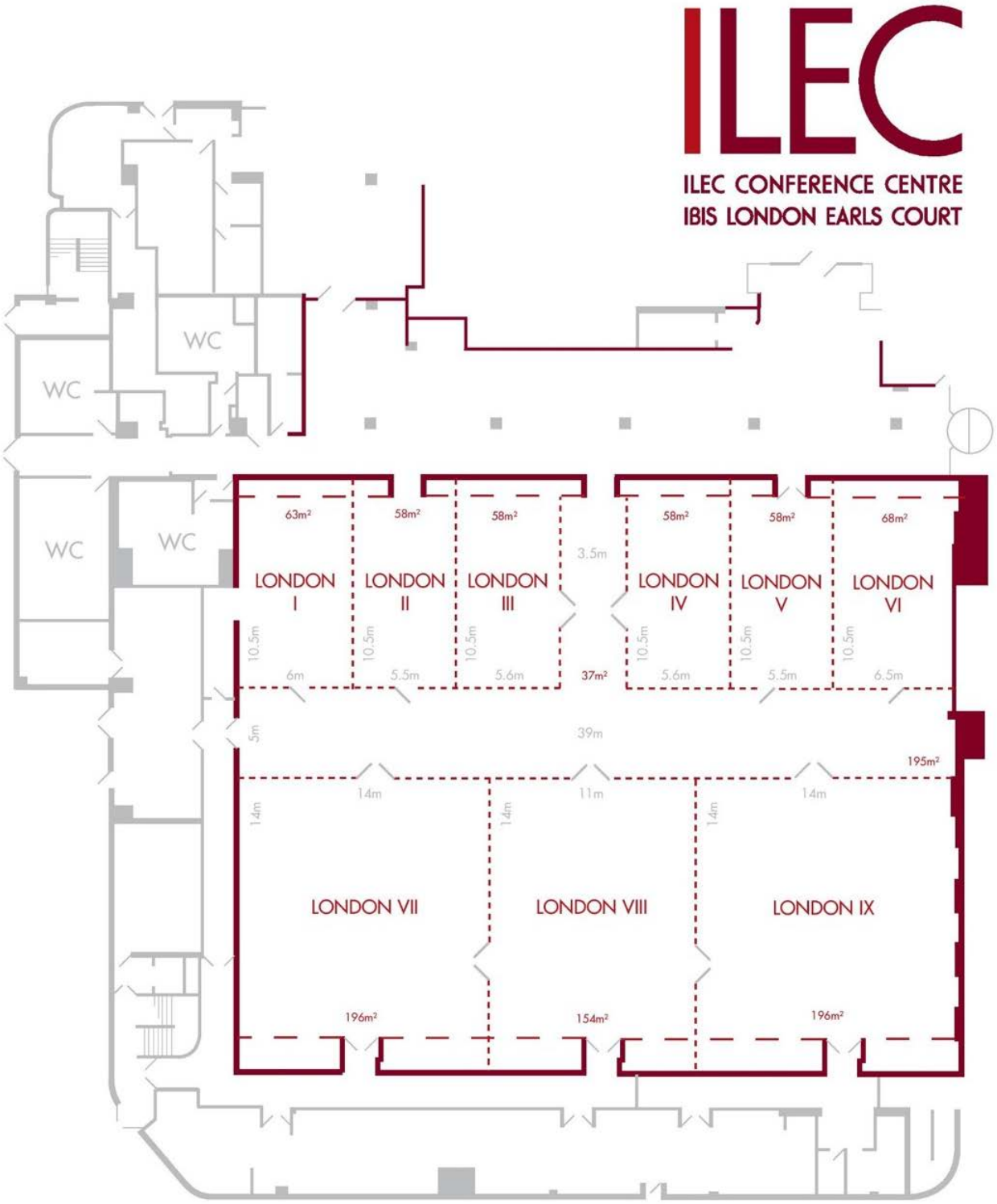
Best Paper Competition - Student and Professional

The 2019 ICNS Conference is sponsoring student and professional Best Paper competitions. Active students and professionals within two years of graduation are eligible for the ICNS Student Best Paper honorarium awards. Those not eligible for Best Student Paper are eligible for Best Professional Paper awards.

Abstract Submission

Authors are invited to submit abstracts by 14 December 2018, addressing one or more of the key topical areas listed above or having a critical relevance to the above aeronautical CNS topics. Abstracts should clearly define the goal of the work, its tasks, methods or results (anticipated or completed) as well as the potential benefits or applications of the work. Abstracts need to be clear and concise, with at least 250 words and no more than 750 words. The abstract submission details will be provided in the ICNS webpages at i-cns.org.

Venue Map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Notes