DASC 42nd

Digital Avionics Systems Conference

Barcelona, Catalonia (Spain) - October 1-5, 2023

"The answer to the ultimate question of life, the universe, and everything is 42"

Deep Thought, the Hitchhikers guide to the Galaxy

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“

A towel, [The Hitchhiker’s Guide to the Galaxy] says, is about the most massively useful thing an interstellar hitchhiker can have. Partly it has great practical value. You can wrap it around you for warmth as you bound across the cold moons of Jaglan Beta; you can lie on it on the brilliant marble-sanded beaches of Santraginus V, inhaling the heady sea vapors; you can sleep under it beneath the stars which shine so redly on the desert world of Kakrafoon; use it to sail a miniraft down the slow heavy River Moth; wet it for use in hand-to-hand-combat; wrap it round your head to ward off noxious fumes or avoid the gaze of the Ravenous Bugblatter Beast of Traal (such a mind-boggingly stupid animal, it assumes that if you can't see it, it can't see you); you can wave your towel in emergencies as a distress signal, and of course dry yourself off with it if it still seems to be clean enough.

”

“

There is an art, or, rather, a knack to flying. The knack lies in learning how to throw yourself at the ground and miss.

”

Douglas Adams, The Hitchhiker's Guide to the Galaxy

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Welcome to the 42nd Digital Avionics Systems Conference

Welcome to Barcelona and the 42nd Digital Avionics Systems Conference (DASC)! We are happy to have the conference once again in Europe this year, following the London DASC in 2018. In Barcelona we have a wonderful city to visit and a terrific venue for the DASC at the conference center in the Polytechnic University of Catalunya.

Europe is the fourth stop in our a four-location cycle for the DASC: west coast US, central US, east coast US, and Europe. This cycle, though, because of the COVID 19 pandemic, during which we held the DASC virtually one year, it has been five years between London and Barcelona. Many of you attended last year's DASC in Portsmouth, Virginia, and we can look forward to meeting in San Diego next year. In 2025, Montreal will be our "central U.S." location. Each year at a new location, the DASC community continues its rich tradition of presenting cutting-edge research and state-of-the-art technology in key areas of interest in aviation and space.

Our conference organizing committee has worked tirelessly to create an international gathering that fully engages attendees and participants. Continuing a new feature introduced last year, we are advertising the Best of Session and Best of Track winners ahead of the conference. We will also repeat the drone competition, which this time will be among high schools from the Catalunya region and will be held on Monday alongside the tutorial sessions and the evening welcome reception.

Our technical program chairs, Erik Theunissen (Netherlands Defence Academy) and Todd Kilbourne (Mosaic ATM), have put together an exciting technical program that encompasses six technical tracks. They are supported by track chairs and session chairs that are dedicated to providing the best forum for a robust exchange of ideas.

We have two motivational keynote speakers on Tuesday morning: Mr. Robert Boyd, Boeing's European lead for Global Sustainability Policy and Partnerships, will speak on the aviation community's commitment to achieving net-zero climate impact by 2050, and Mr. Norm Balchunas, Col USAF (ret) Sr Director, Electronic Warfare and Cybersecurity for Honeywell Aerospace - Services and Connectivity, will talk about how to trust autonomous avionics in a contested environment. Tuesday continues with technical sessions, and we will cap off Tuesday afternoon with the Students' Research Competition and Poster Sessions. Please attend to encourage the finalists as they present and answer questions on their research. In parallel, exhibitors will showcase products and services, answer questions, and present opportunities for collaboration. technical sessions continue through the rest of Wednesday and Thursday.

Our Awards Luncheon will be on Wednesday. Please join us as we present Best of Track, Best of Conference, and Best Student Paper awards. The Awards Luncheon is always a highlight of the conference, and we hope to see you there. Beginning the day on Wednesday, you will hear our panel of industry experts discussing urban air mobility and advanced regional air mobility. On Wednesday evening, we will meet for our gala dinner on the Barcelona waterfront at the Salt Restaurant and Beach Club.. On Thursday morning, our second panel of experts will speak on artificial intelligence as it may be used in aviation.

I wish to thank our conference committee members, the track and session chairs, and our support staff from Conference Catalysts for their tireless efforts to bring this DASC to Spain. Also, let us all thank our sponsors and exhibitors who provide the support that makes our conference so enriching every year.

Finally, on behalf of the AIAA Digital Avionics Technical Committee, the IEEE Aerospace Electronics Systems Society, and the entire conference organizing committee, I would like to welcome you to this third DASC held in Europe. I look forward to interacting with you all and to making this a most memorable gathering in Barcelona of the DASC community. Please reach out to me, the staff, or our Catalunya volunteers to get the answers to any questions you may have. Suggestions for improvements in our conference operations are welcome. Thank you for your participation. I hope each of you has a week of rich and rewarding DASC experiences.

Dr. Chip Meserole
42nd DASC General Chair
Boeing Research and Technology

Dr. Maarten Uijt de Haag
42nd DASC Deputy Chair
TU Berlin

It is our pleasure to welcome you to the 42nd Digital Avionics Systems Conference. This year's conference theme is CONNECTED AIRCRAFT IN AN EVOLVING AVIATION ECOSYSTEM.

After the publication of the call for abstracts, we received an overwhelming response, resulting in a total of 237 technical papers and posters. The submissions have been divided into one poster track and six presentation tracks: Air Traffic Management Machine Learning & Automation (ATM), Unmanned Aircraft Systems & Advanced Air Mobility (UAS/AAM), Communications, Navigation, and Surveillance and Information Networks (CNS), Cyber, Systems, and Software (CSS), Integrated Modular Avionics (IMA), and Human Factors, Space Systems & Special Topics (HF/SSST).

To accommodate the large number of presentations in both the ATM and the UAS/AAM tracks, a further division into sub-tracks had to be performed. As a result, we will have 9 presentations in parallel during most of the technical sessions.

We would like to thank all authors for choosing DASC to present their work and hope that with the current technical program the attention results in professional recognition, new contacts and additional opportunities.

Clearly, organizing and executing a technical program is impossible without session and track chairs, and DASC is fortunate to have so many volunteers to fulfil these roles. We are grateful for both their support and the support from the conference staff. Agility very well summarizes the key quality that was demonstrated during the development of the technical program. On behalf of the Technical Committee, welcome to the 42nd DASC.

Prof. Erik Theunissen
42nd DASC Technical Program Co-Chair
Netherlands Defence Academy (NLDA)

Mr. Todd Kilbourne, PMP
42nd DASC Technical Program Co-Chair
Mosaic ATM and Mosaic Data Science

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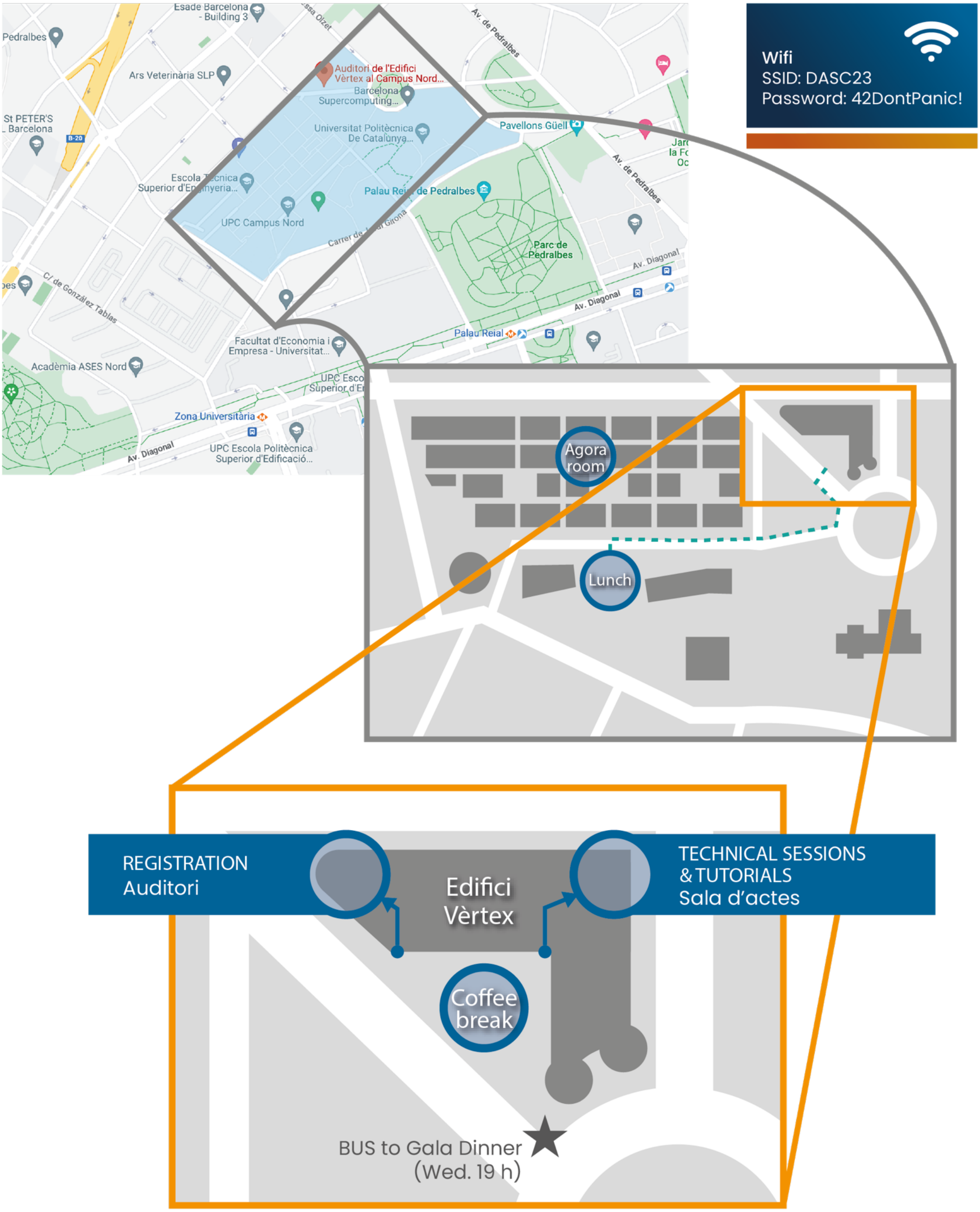
Conference venue:

Vèrtex (VX) building

Plaça d'Eusebi Güell, 6, 08034 Barcelona

https://maps.app.goo.gl/MS8dqwkVvn31qhms6



CEST	Sunday 10/01/23	Monday 10/02/23		Tuesday 10/03/23	Wednesday 10/04/23	Thursday 10/05/23
8:00	8:00-11:00 Tutorials	8:00-11:00 Tutorials				
8:30				8:30-10:30 Opening Remarks & Keynotes	8:30-10:00 Opening remarks & UAM/AAM Panel	8:30-10:00 Opening remarks & Artificial Intelligence Panel
9:00						
9:30						
10:00			10:00-15:00 Drone Competition		10:00 - 10:30 Coffee Break	10:00-10:30 Coffee Break
10:30				10:30-11:00 Coffee Break	10:30-13:00 Technical Sessions	10:30-12:30 Technical Sessions
11:00	11:00-11:30 Coffee Break	11:00-11:30 Coffee Break		11:00-12:30 Technical Sessions		
11:30	11:30-14:30 Tutorials	11:30-14:30 Tutorials				
12:00						
12:30				12:30-13:30 Lunch		12:30-13:30 Lunch
13:00					13:00-15:00 Awards Luncheon	
13:30				13:30-15:30 Technical Sessions		13:30-15:30 Technical Sessions
14:00						
14:30	14:30-15:00 Coffee Break	14:30-15:00 Coffee Break				
15:00	15:00-18:00 Tutorials	15:00-18:00 Tutorials			15:00-15:30 Afternoon Break	
15:30				15:30-16:00 Coffee Break	15:30-18:00 Technical Sessions	15:30-16:00 Coffee Break
16:00				16:00-18:00 Technical Sessions		16:00-18:00 Technical Sessions
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18:00		18:00-20:00 Welcome Reception		18:00-20:00 Exhibitor's Reception		
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20:00					20:00-22:00 Gala Dinner	
20:30						
21:00						
21:30						
22:00						

Opening Remarks

Tuesday, October 3rd | 8:30 | Auditorium

Dr. Chip Meserole
42nd DASC General Chair
Boeing Research and Technology

Prof. Climent Molins
Vice-rector for Transfer, Innovation and Entrepreneurship.
Universitat Politècnica de Catalunya

Keynote Speakers

Tuesday, October 3rd | 8:40-10:30 | Auditorium

Moderator: Chip Meserole, AIAA DATC & The Boeing Company

Robert Boyd
The Boeing Company

Robert joined Boeing International in August 2022 as Regional Lead, Global Sustainability Policy and Partnerships. His role includes representing aviation as Sector Champion, for the World Economic Forum, First Movers Coalition. Prior to joining Boeing, Robert spent nearly 10 years at the International Air Transport Association, ultimately as Assistant Director, Energy Transition and Policy. He led the global trade associations work on industry decarbonization including sustainable aviation fuel. Robert also served as a member of the United Nations ICAO Fuels Task Group, and 4 years on the Board for the Round Table on Sustainable Biomaterials. Robert's studies include a Master's in Economics from the University of Queensland. Prior to joining IATA Robert was the Head Economist for Virgin Australia Airlines.

Aviation's Challenging Path to Net-Zero Climate Impact

There are four pillars to Boeing's strategy—as well as to the strategy of the aviation community overall—for environmental sustainability in aviation: fleet replacement with more efficient aircraft, operational efficiency, alternative fuels, and advanced technology. Of the four, non-fossil sustainable aviation fuel will provide the largest contribution to decarbonization, though building the infrastructure to produce enough of it will take a few decades. Operational efficiency can have an impact soon, and this is where digital systems have a crucial role, in particular for flight optimization for carbon emissions reduction and for avoiding contrail formation. The aviation industry has a strong track record of working together to solve complex problems, and the journey to net zero will require collaboration from all.

Norm Balchunas
Honeywell Aerospace – Services and Connectivity

Norm Balchunas commanded combat units to include B-52s, and deployed bomber operations in Iraq and Afghanistan. Assignments included Special Technical Operations for employment of cybersecurity operations, and Information Operations. Prior to retirement, Norm directed the USAF ROTC program to include 128 Universities, and 984 JROTC high school units around the globe.

Following his service, Norm directed an international military trade association developing electronic warfare and cyber security requirements. Norm then stood up the Drexel University Applied Informatics Group; as Chief Operations Officer for the university research business group, and executed DARPA, AFRL and NRL Electronic Warfare, Connectivity and Informatic programs. Norm was then the Senior Vice President for a cyber analytics company that lead the engineering services for the USAF Operations Center modernization and directed the standup of the Security Exchange Commission Cyber Watch program, monitoring the major stock/trading centers in America.

Norm is currently the Honeywell Service and Connectivity business development director for electronic warfare, and cybersecurity focused on OT/IOT and aviation platform security.

Trusting Autonomous Avionics in a Contested Environment

As the aviation community advances autonomous operations; critical aircraft systems will be exposed to compromised data and intrusions. Modern and legacy engine control units, ACARS over IP, sixth-generation avionics, and a digitized logistics tail need greater cyber protection, monitoring, encryption at the edge, and insights shared at speed for commercial and military platforms. The hard work shaping standards, technology and information sharing laid an incredible foundation for trust and security in-order-to bring revolutionary capabilities into the highly regulated aerospace environment.

Advanced Air Mobility Panel

Wednesday, October 4th | 8:30-10:00 | Auditorium

Moderator: Enrique Casado, Boeing

Advanced Air Mobility will become a major mobility breakthrough in the coming years. The envisioned benefits of such a new transportation mode encompass from a reduced pollution footprint in congested urban areas to a more efficient and straightforward ground transportation. Nevertheless, the challenges to be addressed prior to have deployed those comprehensive AAM environments in cities at its full capability are numerous. Along the panel, experts will share their visions about most relevant technical and certification issues will be discussed with the aim of sharing the expert's vision with the community and, therefore, to foster and motivate researchers to provide solutions enabling safe AAM operations.

Dr. Enrique Casado is senior technical manager at Boeing Research & Technology, currently leading the Airspace Operational Efficiency & Autonomous Operations teams in Brazil and Europe. As team manager, he is leading initiatives focused on developing smart services for airlines and on researching on technology solutions to enable autonomous operations of air vehicles such as contingency management solutions, advanced simulation capabilities or airspace integration among others. Enrique holds an MSc degree in Aeronautical Engineering; an MSc degree in Information Technologies; a Master in International Business Administration; and a PhD in Aerospace and Aeronautics from the University of Glasgow (UK).

Josep Montolio Llenas is a Technical Aeronautical Engineer with over 14 years of experience in the aerospace industry. In 2007, Josep joined PildoLabs as an R+D+i Engineer, dedicating 3 years to support the development of in-house procedure designing software tools. In 2010, he transitioned to EUROCONTROL, participating as Aeronautical Engineer Software Developer to enhance and expand the functionalities of the Radio Frequency Measurement Tool (RFMT), used for monitoring and analyzing ADS-B, Mode-S, and TCAS signals. In 2011, he returned to PildoLabs, where he works as an Aeronautical Engineer to this day. Currently, Josep is responsible for coordinating projects related to Innovative Air Mobility (IAM) at PildoLabs, aiming to integrate drones and eVTOLs into U-space environments and characterizing their navigation performance to define new instrumental procedure design criteria. Additionally, he serves as the Coordinator and Head of Hardware Design, ensuring that all systems developed and integrated by the company meet the desired quality and functionality standards required in each case.

Stéphane Vaubourg has a degree in Computer Science and started his career as an embedded systems software engineer in the aeronautics industry in France, where he had the opportunity to work with major system suppliers (e.g. Safran or Thales). He then joined Dassault Aviation as a Software and Hardware compliance verification engineer supporting the certification of the Falcon business jets and military drones. He has been working for the European Aviation Safety Agency for 11 years. First in the Certification Directorate as a software, avionics and cyber security expert; and from 2022 within the EASA drones team as the drone project manager in charge of U-space (UTM), supporting the implementation of U-space over Europe.

Dr. Bernd Korn is head of the Pilot Assistance Department at the Institute of Flight Guidance of the German Aerospace Center (DLR). Main research topics of his department are flight guidance concepts and technologies, human machine interfaces in the cockpit and future ATM concepts / performance based operations. Particularly, research is carried out on concepts like sectorless ATM, Single/Reduced Crew operations, Automation in ATM, UAS integration, UTM/U-Space and on urban air mobility. Bernd holds a master degree (diploma) in computer science and a doctorate in electrical engineering both from Technical University Braunschweig, Germany. In 1998 he joined DLR and in 2005 he became head of the pilot assistance department. He is a lecturer at Dresden Technical University, has authored or co-authored over 200 scientific publications, is member of several program committees of international conferences and member of AIAA's DATC.

Chris Brinton is the Chair of the Board of Aerial Vantage, a subsidiary of Mosaic ATM. He has been an industry leader in the air traffic management (ATM) research and development (R&D) community for more than 30 years. Mr. Brinton has led numerous research efforts related to the integration of Uncrewed Aerial Systems (UAS) into civil airspace, autonomous systems, flight operations planning, and the application of Artificial Intelligence/Machine Learning (AI/ML) to extract value-added information from UAS-acquired data. At Aerial Vantage, he has conducted Beyond-Visual Line of Sight (BVLOS) UAS flight operations and participated in the development of a large-scale UAS data collection program focusing on agricultural applications.

Dr. Antony Evans is the Director of System Design for Airbus UTM, at Acubed, Airbus's Innovation Center in Sunnyvale, California. Tony has 17 years of research experience in air transportation, and has published widely on air traffic management (ATM), uncrewed traffic management (UTM), urban air mobility (UAM) and aviation and the environment. He has two Masters degrees from the Massachusetts Institute of Technology (MIT) and a PhD from the University of Cambridge.

Navigating the Skies With AI: Exploring AI's Impact on Digital Avionics Systems Panel

Thursday, October 5th | 8:30-10:00 | Auditorium

Moderator: Stephen Cook, Northrop Grumman Aeronautics Systems

Artificial Intelligence has been heralded as the Next Big Thing almost as much as it has been reviled for its seeming amorality. Meanwhile, its rapid advancements have ushered in a new era of innovation across the aviation industry. The integration of AI into digital avionics systems has the potential to transform the aerospace industry, and revolutionize the way we design, operate, and maintain aircraft. In this panel discussion, we will delve into AI's impact on aviation, including its applications, challenges, and future promise.

Dr. Stephen Cook is the Northrop Grumman Fellow in Airworthiness, where he is responsible for developing and implementing airworthiness policy and strategy across Northrop Grumman's portfolio of manned and unmanned aircraft. Within the broader airworthiness community, Dr. Cook leads standards development efforts in multiple consensus standards bodies including the Aerospace Industries Association, ASTM, and the International Civil Aviation Organization. He currently chairs the "Autonomy Design and Operations in Aviation" advisory committee within ASTM. Dr. Cook led the development of ASTM standard F3269-17, "Standard Practice for Methods to Safely Bound Flight Behavior of Unmanned Aircraft Systems Containing Complex Functions," which was the first industry standard published on run-time assurance. Dr. Cook earned his Ph.D. in Aerospace Engineering from the University of Maryland in 2003, and M.S. and B.S. degrees in aerospace engineering from North Carolina State University. He was inducted as an Associate Fellow of AIAA in 2016, was awarded the Engineers' Council Outstanding Engineering Merit Achievement Award in 2018 and received the ASTM Award of Appreciation in 2019.

Dr. Bordain joined Daedalean in October 2022 as President of the Americas to lead innovation, flight testing and partnerships. Previously, she spent seven years at Intel developing industry-leading advances in partnerships with top global OEMs including Lockheed-Martin Corporation, Collins Aerospace, Indra Sistemas, and Mercury Systems. She earned a BS in electrical engineering and an MS in computer science at Clark Atlanta University and a PhD in electrical and computer engineering at the University of Illinois Urbana-Champaign.

Zamira Daw is a Professor of Aircraft Systems at the University of Stuttgart. She earned her PhD at Kassel University in Germany and honed her expertise in model-driven development for safety- critical embedded systems using formal methods during her subsequent postdoctoral research at the University of Maryland in the USA. With 7 years of industry experience in aerospace sector at Raytheon Technologies Research Center, Dr. Daw had contributed to DARPA, ONR and NASA funded project to areas, spanning formal verification, certification, knowledge reasoning, and autonomous systems. In her current academic role, she aims to develop innovative certification methods that streamline the seamless integration of AI into aerospace systems.

After **Florian-Michael Adolf**'s Master's in Autonomous Systems from Bonn-Rhein University in 2006, he specialized in unmanned aerial systems at DLR. His journey began with hands-on mobile robotics at "RoboCup" and field flight tests, shaping his passion for automation and the pursuit of ever-improving technologies. Since 2018, he was the Head of Autonomous Flight at Volocopter, overseeing the development of automation solutions and unmanned aircraft systems. In January 2023, he founded Autonomy79, dedicated to advancing aviation autonomy projects for broader applications. His career spans leadership and technical roles at Volocopter and German Aerospace Center (DLR), marked by innovative achievements such as achieving Europe's first Design Verification together with EASA for public Volocopter flights in Paris and Hamburg, and the fully automated flights for Project CORUS-XUAM with a VoloDrone and a manned air rescue helicopter from ADAC sharing critical airspace through real-time coordination. He finds it equally fascinating to see what solutions can be "taught" to machines, but also instructive to see what machines cannot yet do perfectly. Therefore, his practical experience and V&V perspective on automation combined with his curiosity for ever better (software) technologies has been an integral part of his work focus ever since.

Jean-Guillaume Durand is the Head of Perception at Xwing, a company developing autonomous flight for regional air cargo. Using onboard aircraft sensors, the Xwing Perception team develops certifiable robotics solutions to enable safe autonomous flight (runway and taxiway detection, ground obstacle detection, vision-based navigation, etc.). Prior to joining Xwing, Jean-Guillaume worked on full-stack autonomy and perception for large commercial aircraft at Airbus Wayfinder, and for delivery drones at Amazon Prime Air. He received his Ph.D. from the Georgia Institute of Technology.

DASC 2023 will be hosting a student drone competition for high school students. Local Barcelona area high schools will be racing against each other during the morning session. Student teams will build small drones from a drone kit during an allowed time. After the time is up, the student teams will race their drones against each other. Prizes will be awarded to first, second, and third places.

Figure 1 – Tello Drone

The drone course will be approximately 45 feet length, 20 feet width, and 10 feet tall. The entire course will be enclosed with safety netting on sides and top. There will be 4 LED lit gates which the teams will be required to fly through from the start of the course the finish of the course as outlined in Figure 2. Teams will be ranked on time to complete course. University teams will gain bonus points for number of duckies detected.

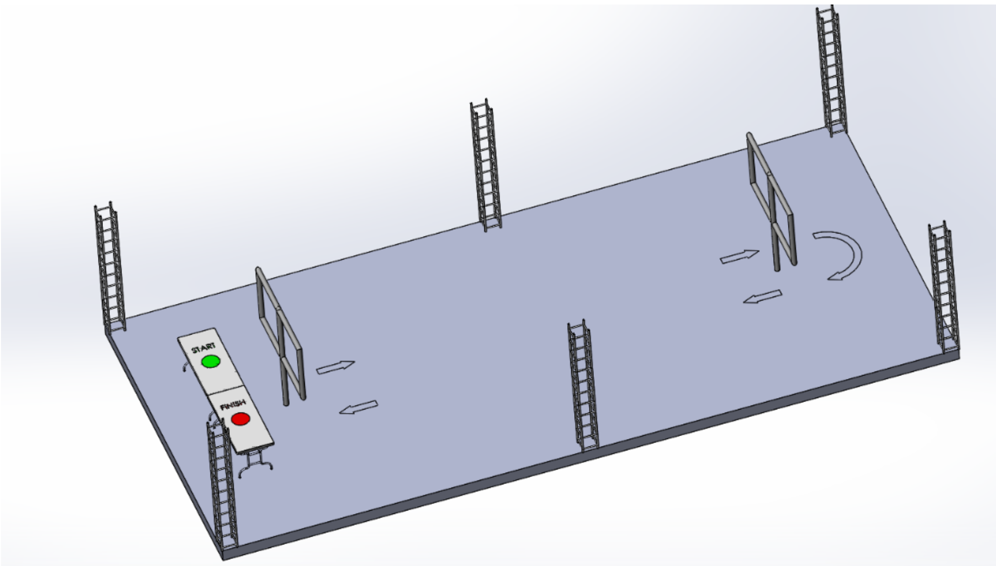

Figure 2- Drone Course Diagram with gates and start/end points.

SALT Restaurant & Beach Club

Passeig Mare Nostrum, 19

https://maps.app.goo.gl/n4pMngeV3mHC5NFj9

· Closest metro stations:

Barceloneta (Line 4 – Yellow)

Drassanes (Line 3 – Green)

· DASC buses will depart the conference venue at 19 h (one way)

SALT
RESTAURANT & BEACH CLUB

CEST	Label	Presenter	Title	Track	Room
Sunday, October 1					
8:00-11:00	SM2	Carlos Insaurralde	Intelligent Control Architecture for Autonomous Vehicles	UAS	S213
11:30-14:30	SL2	Maarten Uijt de Haag	Assured Navigation for Unmanned Aircraft Systems		
15:00-18:00	SA2	Giancarmine Fasano	Detect and Avoid for Unmanned Aircraft Systems		
8:00-11:00	SM3	Krishna Sampigethaya	Introduction to Aviation Cybersecurity	Aviation Cyber-Physical Systems and Security Aircraft Certification - I	S208
8:00-11:00	SM4	Aharon David	The Long and Winding Road Towards Certifying Airborne Artificial Intelligence: Is it Even Feasible? [an AFuzion© tutorial]	Aircraft Certification - I	S214
11:30-14:30	SL4	Vance Hilderman	Applying Agile for DO-178C? Yes! Here's How. [an AFuzion© tutorial]		
11:30-14:30	SL5	Josh Kahn	FREE TUTORIAL (Part I): Model-Based Systems Engineering using MathWorks System Composer	FREE Tutorial	S208
15:00-18:00	SA5	Chris Watkins	FREE TUTORIAL (Part II): Electronic Systems Architecture Modeling (eSAM) Method using MathWorks Systems Composer		
Monday, October 2					
15:00-18:00	MA1	Siddhartha Gupta, Umut Durak	Scenario Modeling for AI-Based Airborne Systems	Autonomy and Aircraft	S213
8:00-11:00	MM2	Vance Hilderman	Avionics Hardware: Applying New Mandatory A(M)C 20-152 Replacing DO-254 & ED-80 [an AFuzion© tutorial]	Aircraft Certification - II	S214
11:30-14:30	ML2	Aharon David	A Paradigm Shift After a Quarter of a Century: The New SAE ARP4754B & ARP4761A and What's Next? [an AFuzion© tutorial]		
15:00-18:00	MA2	Aharon David	Unsettled Issues With Aviation Cyber-Security Certification: What's Wrong With The DO-326/ED-202-Set and How Can We Fix It? [an AFuzion© tutorial]		
11:30-14:30	ML3	Sam Thompson & Adrian Ramos	Deep Dive into Multicore Timing Analysis in A(M)C 20-193 and Rapita's MACH178 Solution	Avionics Hardware	S215
15:00-18:00	MA3	Leonidas Kosmidis, Matina Maria Trompouki	Introduction to Certifiable General Purpose GPU Programming for Avionics Systems		
8:00-11:00	MM4	Rohit Mital, Ram Raju, & Brian O'Donnell	Demystifying Machine and Deep Learning	Autonomy and ATM	S215
8:00-11:00	MM5	Tuan Bui, John Ross, William Vance	Introduction to Multi-Core Processing Interference Channel Analysis, Identification, and Mitigation for Safety-Critical Applications	FREE Tutorial	Sala d'Actes
11:30-14:30	ML5	Sabatini, Kramer, Blasch, et. al.	AESS FREE Tutorial: Intelligent Cyber-Physical Systems for Integrated Air and Space Transport Operations		

UAS

Intelligent Control Architecture for Autonomous Vehicles

The use of remotely-operated vehicles is ultimately limited by economic support costs, and the presence and skills from human operators (pilots). Unmanned craft have the potential to operate with greatly reduced overhead costs and level of operator intervention. The challenging design is for a system that deploys a team of Unmanned Vehicles (UVs) and can perform complex tasks reliably and with minimal (remote) pilot intervention. A critical issue to achieve this is to develop a system with the ability to deal with internal faults, and changes in the environment as well as their impact on sensor outputs used for the planning phase.

The tutorial objective is to present step by step the development process (from requirements to prototyping) of an Intelligent Vehicle Control Architecture (IVCA) that enables multiple collaborating UVs to autonomously carry out missions. The architectural foundation to achieve the IVCA lays on the flexibility of service-oriented computing and agent software technology. An ontological database captures the remote pilot skills, platform capabilities and, changes in the environment. The information captured (stored as knowledge) enables reasoning agents to plan missions based on the current situation. The combination of the two above paradigms makes it possible to develop an IVCA that is able to dynamically reconfigure and adapt itself in order to deal with changes in the operation environment. The ability to perform on-the-fly re-planning of activities when needed increases the chance to succeed in a given mission. The IVCA realization is underpinned by the development of fault-tolerant planning and spooling modules (fault diagnosis and recovery) as well as a module called matchmaker to link services with available capabilities.

The IVCA is generic in nature and can be easily adapted to UVs from different domains (i.e. land, water, and air/space). However, the IVCA aims at a case study where Unmanned Marine Vehicles (UMVs) are required to work cooperatively. They are capable of cooperating autonomously towards the execution of complex activities since they have different but complementary capabilities. The above UMV configuration, where the marine robots are tasked to autonomously do mission works before recovery, is possible at a cost of endowing the UMVs with “intelligence” that in former solutions is provided by remote or even in-situ human pilots.

The IVCA development applies the software/systems engineering principles. The tutorial is structured in four parts. Part I (background) consists of a brief review of technologies related to the IVCA and a comparison of control architectures for autonomous UVs. Part II (requirements analysis and design) entails the user and system requirements, and the system architecture specification/design. Part III (implementation and integration) describes the IVCA realization based on Robot Operating System (ROS) for the above case study. Session IV (verification and validation) deal

Presenter’s Bio

Dr. Carlos C. Insaurralde is a Senior Lecturer in Electronic Engineering in the Department of Engineering Design and Mathematics, University of the West of England, UK. His roles are Programme Leader BEng(Hons) Robotics and Module leader for courses from the Electronic Engineering and Robotics programmes. He received the MEng degree in Electronics from the National University of Cordoba, Argentina, in 1999, the MAst and PhD degrees in Computer Engineering (Mention “Doctor Europaeus” accredited by the European University Association) from the Universidad Complutense de Madrid, Spain, in 2005 and 2007 respectively, and the MPhil degree in Electrical Engineering from Heriot-Watt University, UK in 2014. He also received a PgCert in Learning and Teaching in Higher Education from Teesside University, UK in 2017. He is a Fellow of the Higher Education Academy (FHEA), UK and an IEEE Senior Member.

Dr. Insaurralde has worked in collaboration with EADS (Airbus and Eurocopter), and BAE Systems as well as in different industrial sectors (aerospace, defense, maritime, and industrial automation). He has over twenty years of hands-on experience in software engineering, including over ten years of engineering research experience in robotics and autonomous systems. He is author of over eighty international publications, including a book and five book chapters. He is also author of fifteen technical project reports. His background is in architectures of intelligent and autonomous systems, multidisciplinary development of high-integrity systems, and metric assessment of systems performance. His research interest mainly focuses on intelligent automation and autonomy, including decision-making support for Air Traffic Management (ATM).

Assured Navigation for Unmanned Aircraft Systems

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.

Presenter's Bio

Dr. Uijt de Haag is the Edmund K. Cheng Professor of Electrical Engineering and Computer Science and a Principal Investigator (PI) with the Avionics Engineering Center at Ohio University since 1999. He obtained his M.S.E.E. degree from Delft University in The Netherlands in 1994 and a Ph.D. in Electrical Engineering from Ohio University in Athens, Ohio in 1999. He has authored or co-authored has authored or co-authored over 140 navigation-related publications and seven book chapters.

Detect and Avoid for Unmanned Aircraft Systems

In the latest years, sense and avoid (SAA), or detect and avoid (DAA), has represented one of the main roadblocks to the integration of unmanned aircraft systems (UAS) operations. This course outlines and reviews architectures, technologies, and algorithms for SAA. First, starting from a discussion about what constitutes a UAS and how it is different than manned aircraft, basic SAA definitions and taxonomies are discussed. Ground-based/airborne and cooperative/non-cooperative architectures are covered. The SAA process is dissected into its fundamental tasks, which are discussed in details. Different sensing algorithms and technologies are presented, including radar and optical systems. Potential and challenges of multi-sensor-based systems and data fusion are pointed out. Techniques for conflict detection, and approaches for remotely operated or autonomous avoidance are introduced. The tutorial ends with an overview of current perspectives and recent progress relevant to SAA for UAS integration in the Air Traffic Management (ATM) system and in the framework of UAS Traffic Management (UTM) / U-Space and Urban Air Mobility.

Presenter's Bio

Giancarmine Fasano is Associate Professor at the University of Naples "Federico II", where he holds courses in "Unmanned Aircraft Systems" and "Space Flight Dynamics". His research activities in the field of aeronautics are focused on UAS, and in particular on sense and avoid and cooperative multi-UAV systems. In the space field he is mainly interested in distributed space systems and proximity operations, with emphasis on relative motion design and control. He is Member of the Avionics Systems Panel of the IEEE Aerospace and Electronic Systems Society and Associate Editor of the IEEE AESS Magazine for the UAS area of specialty. He is also Member of the AIAA Sensor Systems and Information Fusion Technical Committee and of the IAA Committee on Small Satellites. He has co-authored over 110 publications and five book chapters.

Aviation Cyber-Physical Systems and Security

Introduction to Aviation Cybersecurity

The cyber threat landscape of aviation is increasing. Threats bring new security risks that are specific to aviation and impact public safety and well-being. This tutorial will introduce you to aviation cyber security, focusing on the aircraft at the center of an increasingly complex and technology-driven aviation ecosystem. Upon completion of this tutorial, you will be able to:

- comprehensively summarize and skillfully analyze today's aviation cyber threat and security landscape.
- considerations in securing crewed aircraft, UAS aircraft, and their supporting systems.
- analyze case studies to evaluate threats from vulnerabilities as well as risks from threats to aviation systems.
- recognize, examine, and compare some of the recent advances in aviation cyber security, including those related to avionics, crew, and aircraft, air traffic control, UAS, and UTM systems.
- cybersecurity terms and concepts and their application to the aviation industry
- Identify and discuss applicable legal and governmental policy frameworks and issues.

Presenter's Bio

Krishna Sampigethaya is currently the Chair for the Department of Cyber Intelligence and Security at the Embry-Riddle Aeronautical University in Prescott, AZ. https://prescott.erau.edu/cyber. The department is DHS/NSA CAE-CD designated, ABET-Cyber accredited, US Cyber Command AEN member, DoD Cyber Scholarship winner, and part of the only NSF SFS institution for aviation and aerospace cyber security.

Krishna received his Ph.D. in electrical engineering from the University of Washington (2007) and was one of the first in the world to defend a thesis on connected vehicle privacy and aviation cyber security research. He then joined The Boeing Company and was soon selected as the first Boeing Associate Technical Fellow for aviation cyber-physical security in 2012. Most recently he was an Associate Director for cyber security at the United Technologies Corporation (UTC) Research Center (2016-2018), focusing on the security of aerospace systems and commercial products. He has also been an Assistant Director for the Masters in Telecom program at the University of Maryland (2014-2015), developing new courses on software-defined networks and connected vehicles.

Krishna founded the first aviation cyber security technical committee, sponsored by the SAE in 2008, and has been organizing aviation cyber security tracks at SAE as well as AIAA/IEEE conferences since then. He co-edited the first special issue on cyber-physical systems, published in the first centennial year issue of the Proceedings of the IEEE journal (2012). He has authored over 50 papers—including 3 award-winning publications (at IEEE DASC and I-CNS)—delivered over 16 keynotes and holds over 16 US patents in aviation cyber security. His work has been recognized in the community with awards such as the American Society of Engineers of Indian Origin (ASEI) Engineer of the Year Award (2013), ASEI Corporate Engineering Excellence Award (2013), and a Best Instructor Award at UMD (2015). Most recently, he led a team of Embry-Riddle cybersecurity program students to design the first aviation cybersecurity competition at the DEF CON Aerospace Village, AIAA, Aviation ISAC, and DHS ACI. He is one of the main instructors for the only in-person ICAO professional course on aviation cyber security.

Aircraft Certification - I

The Long and Winding Road Towards Certifying Airborne Artificial Intelligence: Is it Even Feasible? [an AFuzion© tutorial]

As airborne systems become more and more complex – partly in order to "off load" aircrews, the certification of such systems becomes even more challenging, as the emphasis shifts from the complexity of human behavior to the even greater complexities of systems and software.

For over a decade now, tools (DO-330) and models (DO-331), used for the development of airborne systems and software, need to be qualified, as well as non-deterministic software development techniques such as Object-Oriented (DO-332) – and more guides and standards keep evolving for yet more complex and sophisticated techniques, such as the upcoming AS 6983 for Aviation Artificial-Intelligence (AI) / Machine-Learning (ML) certification.

This 3-hour fast-paced course will introduce attendees to the background, structure, basic concepts and essential practices of the DO-178C supplements DO-330/331/332/333. A brief review of the road ahead and the new paradigms being developed, especially for AI/ML – will wrap up this tutorial.

Presenter's Bio

Aharon David is the Chief WHO (White Hat Officer) of AFuzion-InfoSec, providing Aviation Cyber-Security Certification training & consulting services worldwide. Since 1981, Mr. Aharon David has worked in engineering of software and systems avionics, including junior-to-senior technical management positions. Among other duties, Mr. David served as the commander of the Israeli Air Force's Avionics & Control Software-development Center (ACSC) and head of System-Engineering & Interoperability of the Israeli Missile Defense Organization (IMDO) – and along the way developed, taught & commanded technical courses in the US and Israel, and was a speaker at international technical conferences.

Applying Agile for DO-178C? Yes! Here's How. [an AFuzion© tutorial]

Aviation and avionics systems often use heavy-weight processes based upon V-Model or even Waterfall, wrongly thinking streamlined Agile processes are unsuitable for safety-critical systems. However, Agile in DO-178C has many benefits over traditional software development processes including: 1) Improved Communication via Agile scrums and sprints; 2) More refined tailoring to end-user needs via Agile; 3) Earlier defect discovery via Agile; and 4) Improved cost and schedule via Agile (when done correctly). But how to implement Agile processes for DO-178C and safety-critical aviation software? Are Agile and Safety-critical simply "Oil & Water" that cannot mix, or are they really "Coffee & Milk" which together can produce a great cappuccino or Café Cortado in Barcelona? This Agile for DO-178C training class by AFuzion has taught over 1,500 engineers from 90 aviation companies to garner the benefits of Agile while simultaneously meeting stringent safety-critical software guidelines and standards.

Presenter's Bio

Mr. Vance Hilderman is CTO of AFuzion, the world's largest dedicated avionics certification services company. Hilderman is a 35-year avionics safety-critical engineering expert, holding a BSEE and MBA from Gonzaga University, and a Masters in Computer Engineering from USC (Hughes Fellow). Mr. Hilderman has focused on safety-critical aviation and avionics software, safety, systems, hardware development and related technical certification solutions for his entire career. Hilderman has trained over 35,000 engineers and certification professionals worldwide in ARP4754A/4761 and DO-178C/DO-254. Of the four books published on aviation certification, Hilderman is the author of two. His company AFuzion is America's largest aviation certification services company performing aircraft and avionics development and certification services. AFuzion's solutions are onboard 75% of the world's aircraft via working with 85% of the world's top 400 aircraft and avionics systems developers. Of the top 10 eVTOL aircraft developers, six of those have selected AFuzion's development/certification training, AFuzion Avionics Framework for certification to ARP4754A/DO-178C/DO-254, Mentoring, and/or engineering. Each year AFuzion and Hilderman work in 20+ countries worldwide on 50+ aviation development and certification projects.

FREE Tutorials

FREE TUTORIAL (Part I): Model-Based Systems Engineering using MathWorks System Composer

Engineers use model-based systems engineering (MBSE) to manage system complexity, improve communication, and produce optimized systems. Successful MBSE requires the synthesis of stakeholder requirements into architecture models to create intuitive system descriptions. System ComposerTM, Requirements ToolboxTM, and Simulink® together create a single environment for creating descriptive architecture models that seamlessly bridge into detailed implementation models. The connected environment ensures items across the architecture and design worlds stay in sync. Systems engineers can establish a digital thread to navigate between system requirements, architecture models, implementation models, and embedded software.

The objective of this tutorial is to provide students with hands-on experience practicing model- based systems engineering and architecture modeling using System Composer and Requirements Toolbox from requirements definition through implementation and test in Simulink and Simulink TestTM. This case study involves taking a set of predefined requirements for a small, unmanned air vehicle and modifying and linking them to a new system architecture in System Composer. Various features of MathWorks suite of tools will be explored ranging from requirements decomposition to analysis, implementation, and test.

This tutorial will teach attendees how to practice model-based systems engineering, establishing traceability from system-level requirements to system architecture through implementation and test. The tutorial is limited to 50 attendees only due to computing resource limitations.

What is Expected from the Tutorial Attendees (knowledge, resources, etc.)

- Basic understanding of systems engineering and requirements traceability
- Basic understanding of MATLAB and Simulink.
- Students must bring their own Wi-Fi enabled laptop to access remote virtual machines where System Composer is installed. The students will access the virtual machines through either RDP (preferable for best experience) or from their web browser. Tablets are not sufficient. A mouse is highly recommended.
- Students can test their laptop compatibility with the training system at the link below: https://mathworks.instructorled.training/system-precheck

What Resources are Given to the Attendees

- PDF file containing all presentation slides
- Access to remote virtual machine from their laptop, during tutorial, where they can use System Composer and all necessary workshop files.
- Trial licenses are available through the MathWorks website for attendees wishing to continue their practice after the tutorial.

Presenter's Bio

Josh Kahn is a Senior Application Engineer – Systems Engineering at MathWorks, Inc. Josh has a bachelor's degree in mechanical engineering from Florida Atlantic University and a master's degree in space systems engineering from The University of Michigan. Josh joined MathWorks in 2020, bringing with him ten years of experience in the aviation industry, including leading system development and integration efforts of both military and commercial avionics systems and qualification and test of mechanical and software components. Josh collaborates with MathWorks trusted business partners to develop systems engineering best practices using MathWorks suite of MBSE tools, including System Composer, and also internally provides industry feedback to further the development of the tools to meet customer needs. Most recently, Josh co-authored a paper that won Best of Conference at the 2022 Digital Avionics Systems Conference on data message modeling using the novel eSAM methodology which is being jointly developed with Gulfstream Aerospace Corporation.

FREE TUTORIAL (Part II): Electronic Systems Architecture Modeling (eSAM) Method using MathWorks Systems Composer

The Electronic System Architecture Modeling (eSAM) method has been developed as a novel approach to modeling the integration of system components interconnected across an open Integrated Modular Avionics (IMA) platform. The eSAM method was described in the 2022 DASC paper that was awarded best of conference. Fundamental to this Model Based Systems Engineering (MBSE) approach, eSAM enables system integration models to be constructed independently and agnostic to the system allocation to the IMA platform. eSAM employs a hybrid modeling method where model components are directly connected, similar to traditional federated architectures, even though components are physically connected through the IMA platform. This improves the clarity of the functional system integration, while correctly segregating the roles of system integration and IMA platform allocation. In this way, eSAM addresses a key challenge to modeling IMA system architectures. eSAM leverages the MathWorks System Composer tool, used to model system architectures.

The objective of this tutorial is to enable students to understand the eSAM approach and to gain hands-on experience creating eSAM models within MathWorks System Composer. This can aid the student in deciding whether they might wish to explore evaluating/adopting the eSAM method. The eSAM method is currently under development and maturation. If interested, there may be follow-on opportunities for students to help shape/steer the final realization of the modeling method.

This tutorial will teach attendees:

- How to model system architectures using the eSAM method
- How to realize a distributed system architecture model across the OEM System Integrator, the IMA Platform Provider, and the System Suppliers.
- How system suppliers can fully model their integrated sub-system architecture, irrespective of their allocation to the IMA platform (since they don't own the allocation).
- How the OEM System Integrator performs aircraft-level model integration
- How to automatically generate a Functional Flow Block Diagram from an eSAM system architecture model.

What is Expected from the Tutorial Attendees (knowledge, resources, etc)?

- Basic understanding of systems engineering and requirements traceability
- Basic understanding of MATLAB and Simulink.
- This tutorial leverages System Composer, so we would like to attendees to take the prior scheduled free tutorial on the System Composer. While not a mandatory pre-requisite, we heavily encourage students to attend the System Composer tutorial if they don't already have experience using System Composer.
- Students must bring their own Wi-Fi enabled laptop to access remote virtual machines where System Composer is installed. The students will access the virtual machines through either RDP (preferable for best experience) or from their web browser. Tablets are not sufficient. A mouse is highly recommended.
- Students can test their laptop compatibility with the training system at the link below: https://mathworks.instructorled.training/system-precheck

What Resources are Given to the Attendees?

- PDF file containing all presentation slides
- Access to remote virtual machine from their laptop, during tutorial, where they can use System Composer and all necessary workshop files.

Presenter's Bio

Chris Watkins is a Principal Engineer for MBE/MBSE at the Gulfstream Aerospace Corporation. Mr. Watkins is chief architect of the eSAM method. He serves as the MBSE leader at Gulfstream, guiding tool/workflow selection and rollout. He has extensive industry experience with IMA architectures on Boeing 787, COMAC C919, various military programs, and he brought IMA to the Gulfstream family of aircraft over a decade ago. He holds a Master's degree in Systems Engineering from Missouri University of Science and Technology. He is an AIAA Associate Fellow and lifetime AIAA member.

Autonomy and Aircraft

Scenario Modeling for AI-Based Airborne Systems

AI-based functions and eventually autonomy are getting an increasing interest in airborne systems domain. They surely challenge the ways we are assuring the system safety. Scenario- based testing approaches have recently emerged as an answer to this and have matured quite a bit, especially in the automotive industry in Automated Vehicle domain. This tutorial will showcase scenario modelling techniques for airborne systems with real-life examples and enable attendees to use our scenario modelling tool for their verification needs. Attendees are expected to bring their own laptops to install the Operation Domain Modelling Environment ODME) tool and practice the techniques shown in the tutorial.

Presenters' Bios

Siddhartha Gupta, Clausthal University of Technology, Institute of Informatics, 38678 Clausthal-Zellerfeld, Germany.

Umut Durak, German Aerospace Center (DLR), Institute of Flight Systems, 38108 Braunschweig, Germany. He leads the Avionics Systems Research Group in the Institute of Flight Systems at the German Aerospace Center (DLR).

Aircraft Certification - II

Avionics Hardware: Applying New Mandatory A(M)C 20-152 Replacing DO-254 & ED-80 [an AFuzion© tutorial]

Avionics hardware world-wide is required to follow DO-254 & ED-80 for literally all phases of development: Safety, Requirements, Design, Logic Implementation, V&V, Quality Assurance, etc. However, now the new A(M)C 20-152A supplants DO-254 and addresses modern hardware development including FPGAs, Complex COTS hardware, Circuit Board Assemblies, COTS IP, component management, obsolescence, and many more topics. While DO-254 was partly copied from software's DO-178B, but there are many differences between hardware and software which must be understood to "truly" implement DO-254 and now A(M)C 20-152A. While AC 20-152A may seem onerous to follow, most planes, helicopters, and many UAV's flying today must comply with it including Civil, Military, eVTOL, and UAS. First-time users often complain of costs and schedules doubling while trying to comply. But is A(M)C 20-152A really complex? What are the true meanings of DO-254 and AC 20-152A? How can A(M)C 20-152A be understood and applied cost-effectively the first time? What are the top mistakes when starting DO-254 & 152A projects and how to avoid them? What are the best practices for avionics hardware requirements, design, logic implementation, configuration management, V&V, QA, and certification? these topics are explained in this fast-paced Class.

Presenter's Bio

Mr. Vance Hilderman is CTO of AFuzion, the world's largest dedicated avionics certification services company. Hilderman is a 35-year avionics safety-critical engineering expert, holding a BSEE and MBA from Gonzaga University, and a Masters in Computer Engineering from USC (Hughes Fellow). Mr. Hilderman has focused on safety-critical aviation and avionics software, safety, systems, hardware development and related technical certification solutions for his entire career. Hilderman has trained over 35,000 engineers and certification professionals worldwide in ARP4754A/4761 and DO-178C/DO-254. Of the four books published on aviation certification, Hilderman is the author of two. His company AFuzion is America's largest aviation certification services company performing aircraft and avionics development and certification services. AFuzion's solutions are onboard 75% of the world's aircraft via working with 85% of the world's top 400 aircraft and avionics systems developers. Of the top 10 eVTOL aircraft developers, six of those have selected AFuzion's development/certification training, AFuzion Avionics Framework for certification to ARP4754A/DO-178C/DO-254, Mentoring, and/or engineering. Each year AFuzion and Hilderman work in 20+ countries worldwide on 50+ aviation development and certification projects.

A Paradigm Shift After a Quarter of a Century: The New SAE ARP4754B & ARP4761A and What's Next? [an AFuzion© tutorial]

SAE's ARP4754A: "Guidelines for Development of Civil Aircraft and Systems" and ARP4761: "Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment" have been the "law of the land" for airborne systems certification for over a quarter of a century (4761) and an eighth of a century (4754), since 1996 (4761) and 2011 (4754). But now – a change is coming: the new ARP4754B and ARP4761A: "Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment", aligned with the new ARP4754B: "Guidelines for Development of Civil Aircraft and Systems" are being published this year. This new pair of documents, long due, introduce improved alignment between them, new methodologies and improved clarity. Yet – there are already new safety paradigms, like Human-Factors, STPA, MBSE, Cybersecurity and many others, warming up at SAE's S-18, the committee developing ARP4761 & ARP4754, that are poised to reshape aviation safety later this decade – and beyond. This 3-hour fast-paced course will introduce attendees to the background, structure, basic concepts and essential practices of ARP 4754B and ARP4761A, focusing on the updates from ARP4754A and ARP4761. A brief review of the road ahead and the new paradigms being developed – will wrap up this tutorial.

Presenter's Bio

Aharon David is the Chief WHO (White Hat Officer) of AFuzion-InfoSec, providing Aviation Cyber-Security Certification training & consulting services worldwide. Since 1981, Mr. Aharon David has worked in engineering of software and systems avionics, including junior-to-senior technical management positions. Among other duties, Mr. David served as the commander of the Israeli Air Force's Avionics & Control Software-development Center (ACSC) and head of System-Engineering & Interoperability of the Israeli Missile Defense Organization (IMDO) – and along the way developed, taught & commanded technical courses in the US and Israel, and was a speaker at international technical conferences. In recent years, Mr. David has been a senior advisor to the Civil Air Authority of Israel (CAAI), specifically on software certification and Cyber-Security. He is currently a member of SAE's S-18 "Aircraft & Systems Development and Safety Assessment", S-18A "Autonomy", S-18HF "Human Factors", G-34 "Artificial Intelligence in Aviation" – on which he is an editor of the next-generation standard, and many others. Mr. David holds a BSc in Aerospace Engineering from the Technion – Israel's Institute of Technology, and an MBA from the Tel-Aviv University.

Unsettled Issues With Aviation Cyber-Security Certification: What's Wrong With The DO-326/ED-202-Set and How Can We Fix It? [an AFuzion© tutorial]

The international standards D-326A (U.S.) and ED-202A (Europe) titled "Airworthiness Security Process Specification" are the cornerstones of the "DO-326/ED-202 Set": the only Acceptable Means of Compliance (AMC 20-42) by EASA for aviation cyber-security airworthiness certification, as of Jan 1st, 2021, and enroute to becoming such by the FAA. The "DO-326/ED-202 Set" includes, in addition to DO-326A/ED-202A, the companion documents DO-356A/ED-203A: "Airworthiness Security Methods and Considerations", DO-355A/ED-204A: "Information Security Guidance for Continuing Airworthiness" and the upcoming/newly-updated in only the last year – ED-201A/DO-391: "Aeronautical Information System Security (AISS) Framework Guidance", ED-205A/DO-393: "Process Standard for Security Certification / Declaration of Air Traffic Management / Air Navigation Services (ATM/ANS) Ground Systems" & ED-206/DO-392 "Guidance on Information Security Event Management".

On the horizon, new aviation cybersecurity documents are already being developed, within EUROCAE WG-72/RTCA SC-216, but also (and most interestingly) – beyond these committees: by SAE, ASTM and others.

But are they "perfect"? Definitely not!

This 3-hour fast-paced course will introduce attendees to the background, structure, basic concepts and essential practices, as well as the gaps and challenges of this new, mandatory, set of standards. A review of the unsettled issues of the set, and potential solutions, will wrap up this tutorial.

Presenter's Bio

Aharon David is the Chief WHO (White Hat Officer) of AFuzion-InfoSec, providing Aviation Cyber-Security Certification training & consulting services worldwide. Since 1981, Mr. Aharon David has worked in engineering of software and systems avionics, including junior-to-senior technical management positions. Among other duties, Mr. David served as the commander of the Israeli Air Force's Avionics & Control Software-development Center (ACSC) and head of System-Engineering & Interoperability of the Israeli Missile Defense Organization (IMDO) – and along the way developed, taught & commanded technical courses in the US and Israel, and was a speaker at international technical conferences.

In recent years, Mr. David has been a senior advisor to the Civil Air Authority of Israel (CAAI), specifically on software certification and Cyber-Security. He is currently a member of SAE's S-18 "Aircraft & Systems Development and Safety Assessment", S-18A "Autonomy", S-18HF "Human Factors", G-34 "Artificial Intelligence in Aviation" – on which he is an editor of the next-generation standard, and many others. Mr. David holds a BSc in Aerospace Engineering from the Technion – Israel's Institute of Technology, and an MBA from the Tel-Aviv University.

Deep Dive into Multicore Timing Analysis in A(M)C 20-193 and Rapita's MACH178 Solution

Multi Processor Systems on Chip (MPSoC) are progressively being adopted in the avionics domain to respond to the increasing computing performance demands required to support more sophisticated software functionalities. One of the main challenges associated with the use of MPSoC in Airborne system is related to the complexities and criticality of multicore timing analysis (MTA). In this tutorial, we will present MACH178, a structured approach with well-defined methodology and tools developed at Rapita Systems to produce evidence to support timing characterization and certification of multicore (MPSoC) systems in line with A(M)C 20-193 requirements. The proposed solution has been successfully deployed by Airbus to meet CAST-32A (position paper preceding A(M)C 20-193) objectives, and successfully achieved certification with the Spanish National Institute for Aerospace Technology (INTA) for a multicore system with several DAL A applications simultaneously running on multiple cores in a NXP T2080 processor. This tutorial will introduce the main elements required in any multicore timing analysis process to achieve certification. We will present our MACH178 solution following a bottom up approach from low- level interference channels, hardware event monitors, and critical configuration settings all the way up to AM(C) 20-193 objectives.

Presenter's Bio

Dr Samuel Thompson is a Senior Multicore Analysis Engineer in the multicore team at Rapita Systems Limited, and has a significant role in both the development of Rapita's multicore solution as well as the delivery of customer projects on multicore platforms. Sam's professional background includes work on safety-critical automation projects, systems design, and the analysis of large disparate datasets. He received his PhD from the University of York for the analysis of sub-diffraction-limit light-scattering and dynamic interaction data from engineered nanoparticles.

Introduction to Certifiable General Purpose GPU Programming for Avionics Systems

GPUs are currently considered from all safety critical industries, including avionics and aerospace to accelerate general purpose computations and meet performance requirements of new advanced functionalities, which are not possible with the legacy, single-core processors used in these domains, such as in the recent Airbus project Automatic Taxi, Take- off and Landing (ATTOL) project. However, most of the R&D is currently focused on proof of concepts, which demonstrate the capabilities of employing GPUs in avionics, ignoring the certification challenges introduced by GPUs. This tutorial is the outcome of years or research at Barcelona Supercomputing Center (BSC) and technology transfer within safety critical industries, which culminated in the recent approval of these methods (July 2022) from the competent airworthiness authority in Spain and soon by EASA, for the first time in Europe. The attendees will learn how general purpose GPU code can be developed and certified according to safety critical standards used in these industries by using graphics-based technologies (OpenGL SC 1.0.1 and 2.0) which have are already used in certified safety critical products of the highest criticality (DAL-A avionics according to DO-178C and ASIL D according to ISO 26262). This will include the latest GPU programming API for safety critical systems ratified by Khronos, Vulkan SC, in March 2022, which one of the organisers (Dr. Leonidas Kosmidis) has been one of the earliest adopters and helped to be defined by participating in its Khronos Vulkan Safety Critical Advisory Panel. Special attention will be paid on Brook Auto/BRASIL, an open source technology developed at BSC (https://github.com/lkosmid/brook), which abstracts away the complexities of programming in these graphics based solutions in a CUDA like language, while retaining their certification benefits, and have been demonstrated with industrial use cases. Finally, the tutorial will include a hands-on session with exercises, during which the attendees will have the opportunity to experiment with the certifiable solution(s) of their interest. BSC will provide remote access to relevant GPUs with preinstalled certifiable GPU languages/APIs.

Presenters' Bios

Dr. Leonidas Kosmidis is a Senior Researcher at the Barcelona Supercomputing Center (BSC) and Faculty Member at the Universitat Politècnica de Catalunya (UPC). He holds a PhD and MSc in Computer Architecture from Universitat Politècnica de Catalunya, Spain, and a BSc in Computer Science from University of Crete, Greece. He is leading the research on embedded GPUs and accelerators for safety critical systems, both at hardware and system software level within the CAOS (Computer Architecture/Operating Systems) group at BSC. Dr. Kosmidis is the recipient of the RISC-V Educator of the Year Award in 2019 from the RISC- V Foundation and an Honourable Mention for the EuroSyS Roger Needham PhD Award in 2018, which is awarded to the best PhD thesis in Europe in the area of Systems. He is the Principal Investigator of several projects funded by the European Space Agency (ESA) such as the GPU4S (GPU for Space) and the Horizon Europe METASAT project funded by the European Commission, as well as projects funded by industry such as the Airbus Defence and Space, which focus on the adoption of GPUs in space and avionics systems, including their certification. He is also participating in several standardisation efforts regarding GPU programming in safety critical systems within Khronos, in Vulkan SC and SYCL SC, as well as an external expert for the revision of the ECSS standards ECSS-E-ST-20-40 and ECSS-Q-ST-60-02C on ASIC, FPGA and IP Core developments. Website: https://personals.ac.upc.edu/lkosmidi

Mrs. Matina Maria Trompouki is a Senior Research Engineer at the Barcelona Supercomputing Center (BSC). She holds an MSc in Computer Architecture from Universitat Politècnica de Catalunya, Spain, and a BSc in Computer Science from University of Crete, Greece. Matina is a pioneer in the use of GPUs in safety critical systems, with several scientific publications on this topic. She is the co-author of the open source Brook Auto certification friendly programming language and its qualifiable BRASIL compiler according to the ISO 26262 automotive functional safety standard.

Demystifying Machine and Deep Learning

This tutorial is designed to provide a hands-on, deep dive into Machine Learning and Deep Learning models by applying such models in a real-world use case.

Operators and analysts are being overwhelmed with the amount of data available in aerospace environments. The magnitude of the data becomes potentially too great to analyze by conventional means. Machine Learning has been proposed as a solution to "big data" problems which will enable analysts to evaluate and determine courses of action based on the information derived from the data. A lot of misinformation surrounds Machine Learning and its potential to enhance operational efficiencies and address current challenges.

This tutorial will delve into Machine Learning, Neural Network and Generative AI models and show how such models can solve potential problems of interest to DASC participants. It presents an overview of current technologies but especially the crucial details on Machine Learning algorithms for aspiring or current users so that they can successfully utilize these techniques in their exploitation of existing data. A key aspect of this course is the discussion of how and when Machine Learning is applicable. An overview of emerging technologies in Machine Learning and Artificial Intelligence will be presented. Although many of the examples presented in this course deal with the exploitation of operational data, the techniques can be applied to other data types and domains as well.

Timeliness and intended audience:

Machine learning is gaining traction within the aerospace domain. It is likely that the importance of machine learning will only continue to expand as computers become more efficient and new methods are developed. Whether the audience wants to apply machine learning within their own applications or gain a better understanding of methods being used by their colleagues, this course will help prepare the audience for an era where machine learning has an ever-growing impact on our field.

Presenters' Bios

Mr. Rohit Mital is Chief Digital Officer at KBR. He has over 25 years of experience in developing and delivering high-performance, scalable, complex software systems and solutions in multiple industries, including transportation, insurance, capital markets, telecommunications, and defense. He leads several initiatives in partnership with KBR customers in leveraging digital technologies including Cloud, AI/Machine Learning, Edge Computing and Distributed Ledger. Prior to joining KBR, Rohit spent two decades managing innovation and technology development for early-stage technology companies. He was featured as one of the creative people in small cities across the U.S. by Fast Company in 2004. Rohit has master's degrees in Electrical Engineering and Mathematics. He has published and presented at conferences on big data, machine learning and distributed ledger in transportation and space domains.

Mr. Ramakrishna (Ram) Raju is a subject matter expert supporting FAA and DOT projects at the Volpe National Transportation Systems Center in Cambridge, MA for over 15 years. He has over 25 years of experience in the field of designing and developing IT solutions to meet customer needs. He has successfully led the development and deployment of several mission-critical FAA systems. Ram is also the lead of KBRs AI/ML Academy, a companywide initiative to train KBR staff skills in the AI and ML domain.

Brian O'Donnell is a senior project manager and AI subject matter expert at the Volpe National Transportation Systems Center, an agency of the U.S. Department of Transportation. Before joining Volpe, Brian worked on machine learning, computer vision, and signal processing technologies in industry and the private sector. He served as the Vice President of Technology for G4S, the world's largest security company, and was their subject matter expert for biometrics and intelligent surveillance. Brian invented AI-based stock trading algorithms for a start-up company working as a 'Wall Street Quant.' Brian has a B.S. in Applied Physics and an M.S. in Electrical Engineering and is a doctoral student in computer science with a specialization in AI. In addition, Brian is a senior member of the I.E.E.E. and holds several U.S. patents for machine learning and image processing applications in the defense and surveillance industries. Brian is a retired Navy officer and spent the last part of his career as an Engineering Duty Officer in the Reserves working on Los Angeles Class nuclear submarines.

FREE Tutorials

Introduction to Multi-Core Processing Interference Channel Analysis, Identification, and Mitigation for Safety-Critical Applications

Multi-core processors (MCPs) have been readily available since 2005, but developers have been constrained to using a single core in real-time or safety-critical applications because of the non- deterministic nature of shared resources on a multi-core chip. However, in today's development landscape, the need for heavy processing power combined with physical space limitations has pushed the real-time and safety-critical industries to utilize the full benefit of multi-core processing. With this new requirement comes the need to understand how to mitigate the non- deterministic effects of multi-core processing known as interference channels and maintain a system with full real-time safety-critical compliance. The best way to help the industries with this task is to provide a methodology for analyzing, identifying, and mitigating the effects of the interference channels. The goal of this tutorial is to educate the user and introduce them to these concepts.

This tutorial aims to:

- Educate the audience on multi-core processing interference channels and safety-critical challenges.
- Explain how multi-core processing interference negatively impacts safety-critical industries, such as DoD aviation and commercial aviation.
- Provide an interactive tutorial on the process of analyzing, identifying, and mitigating multi-core processing interference channels in a critical application.
- Explain the benefits of including multi-core characterization and mitigations in the beginning stages of the design of safety-critical applications.
- Discuss the emerging trends in hardware/software and future pathways.

Presenters' Bios

Tuan Bui – US ARMY AvMC Software Airworthiness Division, Systems Readiness Directorate. Tuan Bui is a software engineer working at the U.S. Army AvMC Systems Readiness Directorate (SRD), Software Airworthiness Division. He obtained a master's degree in Computer Engineering from the University Alabama in Huntsville specialized in software. He has over 30 years of experience in embedded systems and software airworthiness evaluation. He currently supports various Army Aviation programs with focus on real-time, safety-critical systems regarding multi- core processors software architect and airworthiness requirements.

John Ross – US ARMY AvMC Multi-Core Processing Laboratory (CTR). John Ross has worked with computer systems since the mid-1990s. He has a degree from the University of Alabama in Huntsville in Computer Engineering, specializing in parallel processing and massively parallel processing (MPP). He has a paper published on the topic of general- purpose GPU processing in the IEEE SouthEastCon 2013. He currently works in the US ARMY multi-core processing lab with over 5 years of experience analyzing the effects of multi-core processing interference on embedded systems.

William Vance – US ARMY AvMC Multi-Core Processing Laboratory (CTR). William Vance is a computer engineer working at the U.S. Army multi-core processing lab. He obtained a master's degree in Computer Engineering from Auburn University. He has over 4 years of experience in embedded programming and software airworthiness evaluation. His research interests are in the areas of multi-core interference analysis and real-time systems. William has authored a paper titled "Insights from Preliminary Analysis of Local Cache Performance in COTS RTOS for Multi-Core Processors".

AESS FREE Tutorial: Intelligent Cyber-Physical Systems for Integrated Air and Space Transport Operations

A surging interest in space launch operations and in Advanced Air Mobility (AAM) concepts is exacerbating the limitations of current practices, still heavily reliant on airspace segregation and not supporting the multimodal/intermodal evolution of air and space transport. For a successful integration of these new transport modes, it is critical that an acceptable level of safety is provided, requiring the development of novel digital tools (e.g., mission planning and decision support systems) that utilize advanced Cyber-Physical Systems (CPS) and Artificial Intelligence (AI) technologies to allow a seamless integration of space operations in the current ATM network. This tutorial addresses the role of Aerospace CPS (ACPS) and AI research to enable the safe, efficient and sustainable development of the air and space transport sector in the next decade. While the technical maturity of propulsive and vehicle technologies is relatively high, there are several opportunities and challenges associated with the adoption of CPS and AI to enable the integration of point-to-point suborbital spaceflight with conventional atmospheric air transport. Current research aims at developing robust and fault-tolerant CPS architectures that ensure trusted autonomous air/space transport operations with the given hardware constraints, despite the uncertainties in physical processes, the limited predictability of environmental conditions, the variability of mission requirements, and the possibility of both cyber and human errors. A key point in these advanced CPS is the control of physical processes from the monitoring of variables and the use of computational intelligence to obtain a deep knowledge of the monitored environment, thus providing timely and more accurate decisions and actions. The growing interconnection of physical and digital elements, and the introduction of highly sophisticated and efficient AI techniques, has led to a new generation of CPS, that is referred to as intelligent (or smart) CPS (iCPS). By equipping physical objects with interfaces to the virtual world, and incorporating intelligent mechanisms to leverage collaboration between these objects, the boundaries between the physical and virtual worlds become blurred. Interactions occurring in the physical world are capable of changing the processing behavior in the virtual world, in a causal relationship that can be exploited for the constant improvement of processes. Exploiting iCPS, intelligent, self-aware, self-managing and self-configuring systems can be built to improve the efficiency of air and space transport, and to build trusted autonomy. However, aviation safety certification is established upon verifying that all possible safety-critical conditions have been identified and verified. Whereas, in the case of AI real-time software evolution cannot be perfectly predicted and verified in advance, this is the real challenge to certification. One solution is to specify AI functional boundaries in correlation with real-time monitoring and validation of AI solution. Implementation can be sequential with practical ground-based AI for scheduling and routing being the starting point. Next in line will be simpler, non-flight critical functions and finally moving on to flight or safety critical systems. Building a certification case requires that the final product operates in all modes and performs consistently and successfully under all actual operational and environmental conditions founded on conformance to the applicable specifications. This is one of the greatest challenges currently faced by the avionics and Air Traffic Management (ATM) industry, which is clearly amplified in the context of future commercial space transport operations. Much attention is currently being devoted to the on-orbit phase, where the unique hazards of the space environment are being examined and the required iCPS evolutions for Resident Space Objects (RSO) de-confliction and collision avoidance are being addressed, including the synergies between existing ground-based tracking systems and rapidly evolving Space-Based Space Surveillance (SBSS) solutions. The advancement of regulatory frameworks supporting spacecraft operations is a conspicuous factor, which requires a holistic approach and extensive government support for the successful development and establishment of sustainable business models, including space debris mitigation strategies, operational risk assessment and liability issues. Within the atmospheric domain, extensions and alternatives to the conventional airspace segregation approaches must be identified including ATM and Air Traffic Flow Management (ATFM) techniques to facilitate the integration of new-entrant platforms. Lastly, adequate modelling approaches to meet on-orbit risk criteria must be developed and evolutionary requirements to improve current operational procedures (and associated regulatory frameworks) must be addressed in order to establish a fully-integrated Multi-Domain Traffic Management (MDTM) framework, including AI-driven situation awareness and decision support mechanisms for air and space traffic management.

Presenters' Bios

Roberto Sabatini is a Professor of Aerospace Engineering at Khalifa University of Science and Technology (UAE) and an Honorary Professor at RMIT University (Australia). He has three decades of experience in Avionics, Spaceflight and Robotics/Autonomous Systems research and education. Throughout his career, Prof. Sabatini has led several industry and government funded research projects and he has authored or co-authored more than 300 peer-reviewed international publications and several books. Prof. Sabatini is a Fellow and Executive of the Institution of Engineers Australia, Fellow of the Royal Aeronautical Society, Fellow of the Royal Institute of Navigation, and Senior Member of IEEE and AIAA. In addition to his primary academic duties and various honorary/consulting appointments in Europe, North America, Australia, Asia and South Africa, he contributes to the IEEE community as member of the AESS Board of Governors, Chair of the AESS Avionics Systems Panel, and AESS Distinguished Lecturer, as well as editorial board member for various IEEE journals and book series, including the IEEE Transaction on Aerospace and Electronic Systems, the IEEE Series on Aeronautics and Astronautics Systems, and the AESS Systems Magazine.

Kathleen Kramer is a Professor of Electrical Engineering at the University of San Diego, San Diego, CA, USA. Her technical interests are in multisensor data fusion and applications of neural and fuzzy systems to navigation and data security. She is a Distinguished Lecturer for IEEE Aerospace & Electronics Systems Society (AESS). She chairs the IEEE AESS Technical Panel on Cyber Security and is a member of their Avionics Systems Panel. She served as Director of Engineering at the University of San Diego, providing academic leadership over its Engineering Programs for over nine years. She served as the 2019-21 IEEE Secretary & Director. She received the B.S. degree in electrical engineering magna cum laude with a second major in physics from Loyola Marymount University, and the M.S. and Ph.D. degrees in electrical engineering from the California Institute of Technology.

Erik P. Blasch, Ph.D./MBA, is a program officer with the Air Force Research Laboratory. He received his B.S. in Mech. Eng. from the Massachusetts Institute of Technology and Ph.D. in Electrical Eng. from Wright State University in addition to numerous Master's Degrees in Mech. Eng., Ind. Eng., Elect. Eng., Medicine, Military Studies, and Economics. Additionally, his assignments include Colonel (ret) in the USAF reserves, adjunct associate professor, and president of professional societies. His areas of research include information-fusion performance evaluation, image fusion, avionics, and human-machine integration; compiling over 120 journal papers, 900 publications, 42 patents, and 8 books. He is a Fellow of AIAA, IEEE, MSS, and SPIE.

Giancarmine Fasano is Associate Professor at the University of Naples "Federico II", where he holds courses in "Unmanned Aircraft Systems", "Design of Autonomous Aircraft", and "Space Flight Dynamics". His research activities in the field of aeronautics are focused on UAS, and in particular on sense and avoid and cooperative multi-UAV systems. In the space field he is mainly interested in distributed space systems and proximity operations, with emphasis on relative motion design and control, and space situational awareness. He is Member of the Avionics Systems Panel of the IEEE Aerospace and Electronic Systems Society (AESS), Senior Editor of IEEE Transactions on Aerospace and Electronic Systems for the Avionics Area, Associate Editor of the IEEE AES Magazine for the UAS area of specialty. He is also Member of the AIAA Sensor Systems and Information Fusion Technical Committee and has been member of the IAA Committee on Small Satellites. He has co-authored over 150 publications and five book chapters.

Aloke Roy is the Managing Partner at Visionar Systems, LLC, which provides systems engineering services to the aerospace industry. Mr. Roy covers technology research on artificial intelligence, machine learning, cyber security and wireless communications. Prior to this, Mr. Roy was with Honeywell Advanced Technology organization managing data communication, information security and radio technology development programs supporting Honeywell Aerospace. Currently, Mr. Roy chairs RTCA Special Committee 223, which is developing the Aviation Internet Protocol and Aeronautical Mobile Airport Communication System requirements and operational performance standards. Mr. Roy is an advisor to FAA on communication and cyber security technologies and participates at ICAO Communications Panel on behalf of FAA. Mr. Roy holds several patents on aeronautical, wireless and secure communications. He was the President of a Maryland-DC-Virginia volunteer cultural organization with 1000+ members; the Chair of IEEE Avionics Systems Panel; General Conference Chair of DASC 2019 and ICNS 2017.

Irfan Majid is an Assistant Professor in the Department of Avionics Engineering at Institute of Space Technology, Islamabad, Pakistan. He is a seasoned Avionics Engineer with over thirty years of experience. His work experiences include avionics maintenance and life cycle support, research and development for design of avionics systems for manned and unmanned aircraft. Presently he teaches Avionics System Design and Guidance & Navigation courses to Avionics Engineering students and conducts research related to avionics systems. His current research areas include certification for AI/ML in safety critical systems, CNS systems for UAM and Aircraft Electromagnetic Compatibility Analysis. He has authored a number of journal publications and a book chapter.

Carlos C. Insaurralde is a Senior Lecturer in Electronic Engineering at the University of the West of England, Bristol, UK. He has worked in US-funded(AFRL), UK-funded(MoD), and EU-funded projects on robotics and autonomous systems with different application domains (ground, sea, air, and space). He has over twenty-five years of hands-on experience in software engineering for robotics and autonomous systems along with solid expertise in embedded systems and CPSs. He is member of the ASP and a Distinguished Lecturer for IEEE Aerospace & Electronics Systems Society (AESS). His research interests are multidisciplinary development of high-integrity systems, architectures of intelligent and autonomous systems, and metric assessment of systems performance. He is author of over one hundred international publications and twenty technical reports. He also received a mention “Doctor Europaeus” accredited by the European University Association in 2007, and Best of Session Paper awards at the Digital Avionics Systems Conference (DASC), 2004, 2008, 2013, 2014, and 2022 as well as appreciation awards for significant contribution as Track and Session Chair at DASC in 2016, 2021, and 2022. He is also a tutorial instructor for Intelligent Control Vehicle Architectures at DASC since 2018.

Alessandro Gardi is an Assistant Professor at Khalifa University (UAE) and Associate of RMIT University (Australia). He obtained BSc and MSc degrees in Aerospace Engineering from Politecnico di Milano (Italy) and a PhD in the same discipline from RMIT University. Dr Gardi’s research focuses on aerospace cyber-physical systems (UAS, satellites, ATM systems and avionics). In this domain, he specializes in multi-objective trajectory optimization with emphasis on optimal control methods, multidisciplinary design optimization and AI/metaheuristics for air and space platforms.

NOTES:

Track 1: Air Traffic Management Machine Learning & Automation (ATM) Chairs

Billy Josefsson
LFV

Rainer Koelle
EUROCONTROL

Track 2: Unmanned Aircraft Systems & Advanced Air Mobility (UAS/AAM) Chairs

Bernd Korn
DLR

Stephen Cook
Northrop Grumman

Steve Young
NASA

Track 3: Communications, Navigation, and Surveillance and Information Networks (CNS) Chairs

Michael Schnell
DLR

Rafael Apaza
NASA

Track 4: Cyber, Systems, and Software (CSS) Chairs

Kathleen Kramer
UCSD

Maria Consiglio
NASA

Track 5: Integrated Modular Avionics (IMA) Chairs

Steve Vanderleest
Boeing

Bjoern Annighoefer
University of Stuttgart

Track 6: Human Factors, Space Systems & Special Topics (HF/SSST) Chairs

Tim Etherington
NASA

Jan Bořil
University of Defence

Poster Papers Chair

Giancarmine Fasano
University of Naples

NOTES:

CEST	11:00	11:30	12:00
Digital Team (ATCO, Aircrew) and Workload Chairs: Lothar Meyer, Mayara Conde Rocha Murca Track 1 ***S215***	**A Human-in-the-Loop Study on the Dynamic Sectorization Concept for Air Traffic Control in Shannon Airspace** Nils Ahrenhold, German Aerospace Center (DLR)	**Applying the Assessment List for Trustworthy Artificial Intelligence on the Development of AI Supported Air Traffic Controller Operations** Thomas Stefani, German Aerospace Center (DLR)	
UAS Operations 2 Chair: Evan Dill Track 2 ***Sala d'Actes***	**Assessment of Ant Colony Optimization on Inducing Non-Uniform Population Distribution for UAS Risk Assessment in Urban Environments** Anush Kumar Sivakumar, Nanyang Technological University	**Multi-Sensor Placement and Information Fusion Analysis to Enable Beyond Visual Line of Sight Operations for Small Uncrewed Aerial Vehicles** Ali Raz, George Mason University	
UAS/AAM Landing Systems Chair: Felix Sievers Track 2 ***S213***	**Automatic in Flight Conflict Resolution for Urban Air Mobility Using Fluid Flow Vector Field Based Guidance Algorithm** Zeynep Bilgin, Technical University of Munich	**Modelling the Risk of Collision Between UAM Aircraft and Obstacles Using a Multivariate Gaussian Model** Naomi Hani Gray, Korea Aerospace University	
Surveillance Safety Services Chair: Michael Schnell Track 3 ***S217***	**OpenSky Report 2023: Low Altitude Traffic Awareness for Light Aircraft with FLARM** Martin Strohmeier, armasuisse S+T	**Evaluation of a Trajectory Prediction Algorithm Within a Ground Collision Avoidance System** Loyd Hook, University of Tulsa	
Cybersecurity 2 Chairs: Kathleen Kramer, Ganesh Pai Track 4 ***S218***	**Enhancing Security, Privacy, and Trust in Connected UAV Systems** Ravi Mukkamala, Old Dominion University	**Adaptable Hardware Fingerprinting for Radio Data Links and Avionics Buses in Adversarial Settings** Simon Birnbach, University of Oxford	**Open Challenge for Intrusion Detection on Air-Ground Communication: From Data Analysis to Simulation** Daniel Patrick Pereira, Airbus Defence and Space GmbH
IMA Certification & Standards Chairs: Darbaz Darwesh, Umut Durak Track 5 ***S214***	**System Integration for Modular Open System Approach Compliant Integrated Avionics Architectures** Javier Gadea, TTTech	**Model-Based IMA Platform Development and Certification Ecosystem** Yıldız Uludağ, TÜBİTAK BİLGEM	**Building FACE Data Models from Existing Systems** Travis Rogers, Georgia Tech Research Institute
Air Traffic Control Human Factors Chair: Juan Rebollo Track 6 ***S216***	**Effects on ATCO Training When Working in a Flight Centric ATC Environment** Carmo Sonja Kluenker, German Aerospace Center (DLR)	**Flow-Centric Air Traffic Control: Human in the Loop Simulation Experiment** Ahmad Sufian Bin Jumad, Nanyang Technological University	

Technical Sessions - Tuesday, October 3, 13:30-15:30

CEST	13:30	14:00	14:30	15:00
Aerodrome Operations **Chairs: Joachim Koitsalu, Carmo Kluenker** Track 1 ***S215***	**Predicting Airport Runway Configurations for Decision-Support Using Supervised Learning** Milad Memarzadeh, Universities Space Research Association, NASA Ames Research Center	**Departure Scheduling for Multi-Airport System Using Multi-Agent Reinforcement Learning** Ziqi Li, Beihang University	**Visual Approach Start Time Prediction for San Francisco Airport Using Machine Learning** Chris Brinton, Mosaic ATM, Inc.	**Assessing the Environmental Impact of Continuous Descent Operations Based on Quick Access Recorder and Surveillance Data** Javier Lopez-Leones, The Boeing Company
Safety Applications **Chairs: Martin Strohmeier, Lothar Meyer** Track 1 ***S219***	**Safety Validation for Deep Reinforcement Learning Based Aircraft Separation Assurance with Adaptive Stress Testing** Marc Brittain, MIT Lincoln Laboratory	**Detection and Analysis of Aviation Safety Events Using Historic Flight Data** Bae-Seon Park, Inha University		
UAS Operations 1 **Chair: Evan Dill** Track 2 ***Sala d'Actes***	**Generating Efficient Sensor Paths for Ground Target Search: A Performance Parameter and GIS-Driven Approach** Johannes Ostler, University of the Bundeswehr Munich	**Mission Planning for a Multiple-UAV Patrol System in an Obstructed Airport Environment** Ruifan Liu, Cranfield University	**Map View for Remote Control of Drones** Tatsuo Minohara, Chiba University of Commerce, Faculty of Policy Informatics	**Machine Learning Based Predictive Handover in Unmanned Aerial Systems Communication** Tülay Aydin, University of the Bundeswehr (Federal Armed Forces) Munich
Detect-and-Avoid **Chair: Adan Vela** Track 2 ***S208***	**Assessing Helicopter Pilots' Detect and Avoid and Collision Avoidance Performance with ACAS Xr** Robert Rorie, NASA	**MALE RPAS Integration Into European Airspace: Real-Time Simulation Analysis of Operations with Detect and Avoid** Emmanuel Sunil, Netherlands Aerospace Laboratory	**Position Correlated Vision Dataset from Multirotor and Fixed-Wing sUAS of General Aviation, Fixed-Wing sUAS, Multirotor sUAS, and Birds** Chester Dolph, NASA	
UAS Navigation **Chair: Bernd Korn** Track 2 ***S213***	**Design and Hardware-in-the-Loop Evaluation of a Time Dissemination Framework for Drone Operations in Urban Environments** Sorin Andrei Negru, Cranfield University	**Unmanned Aerial Vehicle Positioning Using 5G New Radio Technology in Urban Environment** Saba Al-Rubaye, Cranfield University	**Cooperative Unmanned Aircraft Navigation for Urban Cargo Transportation** Maarten Uijt de Haag, TU Berlin	**Enabling UAVs Night-Time Navigation Through Mutual Information-Based Matching of Event-Generated Images** Naiara Escudero, Boeing Research & Technology
Learned Based Methods for Navigation **Chair: Rafael Apaza** Track 3 ***S217***	**Combination and Selection of Machine Learning Algorithms in GNSS Architecture Design for Concurrent Executions with HIL Testing** Zhengjia Xu, Cranfield University	**Federated Meta Learning for Visual Navigation in GPS-Denied Urban Airspace** Zhengxin Yu, Lancaster University	**AI-Powered Vision-Aided Navigation and Ground Obstacles Detection for UAM Approach and Landing** Enrico Miccio, University of Naples	**A DME Interference Signal Identification and Mitigation Approach Based on Gaussian Mixture Model Used for BDS B2A Receivers** Siqi Huang, Beihang University
Cybersecurity 1 **Chair: Maria Consiglio** Track 4 ***S218***	**A Concept Enabling Cybersecurity for a Self-Adaptive Avionics Platform with Respect to RTCA DO-326 and RTCA DO-356** Mario Werthwein, University of Stuttgart	**Cybersecurity Engineering: Bridging the Security Gaps in Avionics Architectures and DO-326A/ED-202A** Fahad Siddiqui, Centre for Secure Information Technologies (CSIT), Queen's University Belfast	**Developing Secure Hardware for UAV Authorisation Using Lightweight Authentication** Muhammet Abdurrahim Sen, Cranfield University	**Don't Panic. Analysing the Impact of Attacks on the Safety of Flight Management Systems** Luca Maria Castiglione, Imperial College London
IMA Avionics Systems **Chairs: Denis Loubach, Umut Durak** Track 5 ***S214***	**Integration of Software-Defined Radio Avionics Modules Into a Simulated IMA Architecture** Amirhossein Shoaraye Nejati, École de Technologie Supérieure	**Using Autoencoders to Identify Aged, Faulty and Unknown Peripherals in the Adaptive IMA System** Bastian Luettig, University of Stuttgart	**Modular System Management Software Reference Architecture (EWSPMan) for Airborne Electronic Warfare Self-Protection Systems** Mustafa Dursun, Aselsan Inc.	**Interfacing and Testing High-Resolution, Video-Based Avionics and Mission Systems That Use ARINC 818-3** Tim Keller, Great River Technology
Emergency Landing Support **Chair: Kapil Seth** Track 6 ***S216***	**A User-Centered Extended Reality Authoring Tool Development Framework for General Aviation Weather Training** Jiwon Kim, Iowa State University	**Aircraft Emergency Landing Site Selection: A Hierarchical Approach** David Nospes, Aeronautical Engineering		

Technical Sessions - Tuesday, October 3, 16:00-18:00

CEST	16:00	16:30	17:00	17:30
Arrival Management **Chairs: Anton Conte, Mayara Conde Rocha Murca** Track 1 ***S215***	**Enabling Established on Required Navigation Performance Usage to Reduce Carbon Emissions** Ryan Bechtel, The MITRE Corporation	**Multi-Agent Aircraft Estimated Time of Arrival Prediction in Terminal Airspace** Hong-Cheol Choi, Purdue University	**Assessment of Data-Driven Methodologies to Predict Arrival Times for Airborne Flights** Andres Muñoz Hernández, Boeing Research & Technology Europe	**Towards Characterising Inefficiencies and Constraints in Airport Arrival Synchronisation for Higher Levels of Operational Efficiency** Rainer Koelle, EUROCONTROL
Support for Higher Operational Performance **Chairs: Henrik Hardell, Martin Strohmeier** Track 1 ***S219***	**AVIBRIEF: Automated Vocal Information Briefings Dataset** Andrew Johnson, Cirrus Design Corporation	**Supporting Air Traffic Controllers in Handling Sector Specific Tasks, Enabled by the Use of the Boundary Arrival Task Manager** Rabeb Abdellaoui, DLR	**Data-Driven Models for Accurate Estimation of Fuel Consumption Using Deep Learning Techniques** Antonio Gracia-Berná, The Boeing Company	
AAM Operations 1 **Chair: Steven Young** Track 2 ***Sala d'Actes***	**Impact of Flight Speed Distribution on Efficiency of Urban Air Traffic Network** Tingyu Gong, Cranfield University	**Safety Risk Assessment Based Minimum Separation Boundary for UAM Operations** Junsoo Kim, KAIST	**Co-Simulation Digital Twin Framework for Testing Future Advanced Air Mobility Concepts: A Study with BlueSky and AirSim** Junjie Zhao, Cranfield University	**Intelligent Vertiport Traffic Flow Management for Scalable Advanced Air Mobility Operations** Christopher Conrad, Cranfield University
Safety and Certification 1 **Chair: Natasha Neogi** Track 2 ***S208***	**Towards a Standardized Reinforcement Learning Framework for AAM Contingency Management** Luis Alvarez, MIT Lincoln Laboratory	**Scenario-Based Methods for Machine Learning Assurance** Manuel Hirschle, Collins Aerospace	**High-Intensity Radiated Field (HIRF) Map - An Avoidance Approach for UAM, AAM, and UAS Vehicles** Truong Nguyen, NASA	**Quantification of Motor Failure Influence on Quad-Rotor Crash Area Using Statistical Analysis** Anush Kumar Sivakumar, Nanyang Technological University
Human-Machine Teaming 1 **Chair: Max Friedrich** Track 2 ***S213***	**A Methodology for Evaluating the Safety and Effectiveness of Alternative Crewing Arrangements for Next-Generation Remotely Piloted Aircraft Systems** Andrew Neal, The University of Queensland	**On Automation of Flight Training of AI Pilots: A Formal Language to Particularize Flight Instruction Scenarios** Christoph Regli, Zurich University of Applied Sciences	**Experimental Results from Preliminary Tests of a Decision Support System for Avionics Analytics** Carlos Insaurralde, Bristol Robotics Laboratory, University of the West of England	
Communications **Chair: Todd Kilbourne** Track 3 ***S217***	**Utilizing Satellite Communication to Enable Robust Future Flight Data Links** Huw Whitworth, Cranfield Univeristy	**Rationale for a New Transport Protocol in the Aeronautical Telecommunication Network** Soa Valencia Lala, National School of Civil Aviation	**Exploring Virtual Tower System Design Using AeroMACS for Improving the Efficiency of Flight Operations** Fahad Masood Siddiqui, Management and Consultancy Excellence Qatar Limited, Mace Group	**Multi-Agent Deep Reinforcement Learning for Spectrum and Air Traffic Management in UAM with Resource Constraints** Rafael Apaza, NASA Glenn Research Center
AI/ML Computer Vision and V&V **Chairs: Maria Consiglio, Kathleen Kramer** Track 4 ***S218***	**Architectural Challenges in Developing an AI-Based Collision Avoidance System** Vincent Janson, German Aerospace Center (DLR)	**Adversarial Attacks and Defense on an Aircraft Classification Model Using a Generative Adversarial Network** Jamison Colter, Southwest Research Institute	**A Semantically Informed Benchmark Dataset for Computer Vision in Aviation Systems** Sarah Reynolds, Embry–Riddle Aeronautical University	**Machine Learning-Based Batch Processing for Calibration of Model and Noise Parameters** Kyuman Lee, Kyungpook National University
IMA Development **Chairs: Corinna Schmitt, Michael Durling** Track 5 ***S214***	**State-of-the-Art Technologies for Integrated Modular Avionics and the Way Ahead** Bojan Lukić, German Aerospace Center (DLR)	**Introduction of a Dedicated Platform Level for IMA Systems Development with an Extensive Automation Tool Support** Peter Müller, Diehl Aerospace GmbH		
Flight Deck Human Factors **Chair: Jiwon Kim** Track 6 ***S216***	**Pilots' Perceived Workload and Flight Performance While Interacting with Touchscreen Inceptor During 'Instrument Landings** Jingyi Zhang, Cranfield University	**An Improved TCAS Display Based on Aircraft Separation** Brian Butka, Embry-Riddle Aeronautical University	**Pilot Controls for a Hybrid Turbine-Electric 17 Engine Aircraft** Jarvis Arthur III, NASA	

Technical Sessions - Wednesday, October 4, 10:30-13:00

CEST	10:30	11:00	11:30	12:00	12:30
ATCO support Chairs: Karl-Johan Klang, Joachim Koitsalu Track 1 ***S215***	**Influence of Automatic Speech Recognition and Understanding on Flight Efficiency and Throughput – A Human-in-the-Loop Study** Nils Ahrenhold, German Aerospace Center (DLR)	**Enabling Digital Air Traffic Controller Assistant Through Human-Autonomy Teaming Design** Lukas Tyburzy, German Aerospace Center (DLR)	**A BERT-Based Intent Recognition and Slot Filling Joint Model for Air Traffic Control Instruction Understanding** Minghua Zhang, Beihang University		
Trajectory Characterization and Optimization Chair: Erik Liljeroth Track 1 ***S219***	**Fast Marching Tree Applied to Geodesic Trajectories in Presence of Uncertain Wind: A Day of Flights in Europe Study** Céline Demouge, National School of Civil Aviation	**Air Traffic Trajectory Clustering Using Procrustes Analysis** Anthony Chiaratti, Queensland University of Technology	**A Novel Transformer-Based Trajectory Options Generator for Collaborative Air Traffic Flow Management** Yang Yang, Beihang University		
AAM Operations Analysis Chair: Mallory Graydon Track 2 ***Sala d'Actes***	**Safety and Capacity Analysis Framework for Integrated UAM Operation in Airports** Naomi Hani Gray, Korea Aerospace University	**Building a Performance Comparison Framework for Urban Air Mobility Airspace Management Concepts** Rabeb Abdellaoui, DLR	**A Risk-Based UAM Airspace Capacity Assessment Method Using Monte Carlo Simulation** Yu Su, Cranfield University	**Analyzing Fragility of the Advanced Air Mobility System and Exploring Antifragile Networks** Arinc Tutku Altun, Cranfield University	**Sensitivity Analysis of Fleet Size for Urban Air Mobility** Jungu Kang, Korea Aerospace University
Collision Avoidance Chair: Andrew Videmsek Track 2 ***S208***	**Remote ID for Separation Provision and Multi-Agent Navigation** Evgenii Vinogradov, Technology Innovation Institute	**Dynamic Separation Minima Prediction with Collision Risk Modelling (CRM)** Christantus Nnamani, Cranfield University	**Surrogate Modeling of Optimal Control Based Collision Avoidance System for Multirotor Unmanned Aerial Vehicles** Jiří Novák, Brno University of Technology, Faculty of Information Technology		
UAS Traffic Management Technologies Chairs: Bernd Korn, Stephane Mondoloni Track 2 ***S213***	**Aerial Vehicle Routing and Scheduling for UAS Traffic Management: A Hybrid Monte Carlo Tree Search Approach** Krishna Kalyanam, NASA Ames	**Conflict Probability Based Strategic Conflict Resolution for UAS Traffic Management** Yiwen Tang, Cranfield University	**Development and Real-Flight Testing of Volume-Based Situation Awareness Technology for Integrated Reconnaissance Missions** Adriana Andreeva-Mori, Japan Aerospace Exploration Agency	**Hybrid AI-Based Dynamic Re-Routing Method for Dense Low-Altitude Air Traffic Operations** Yibing Xie, RMIT University	**A Performance Characterization of AI Algorithms on Energy-Efficient Hardware with Applications to Robust Autonomous Landing** Antonio Gracia-Berná, The Boeing Company
Performance Based Navigation and Technologies Chairs: Jordan Sakakeeny, Connie Brasil Track 3 ***S217***	**SESAR Wave 2 Developments in APNT** Ayse Sicramaz Ayaz, German Aerospace Center (DLR)	**Advanced PBN Departure Procedures for Flight Operational Efficiency** David De Smedt, EUROCONTROL	**Evaluation of New Satellite-Based Approach Procedures Enabled by Advanced Receiver Autonomous Integrity Monitoring Algorithms: A Case Study of a Brazilian Airport** Glaucia Balvedi, Boeing	**Leveraging Signal Strength as a Mechanism to Secure GPS Messages** Juan Ortiz Couder, Embry-Riddle Aeronautical University	
Certification and Overarching Properties Chair: Steven Harbour Track 4 ***S218***	**Leveling Arguments: Easier Said Than Done** Zamira Daw, University of Stuttgart	**The Current Regulatory Framework and the Overarching Properties** Mohamad Ibrahim, TU Clausthal	**CLARISSA: Foundations, Tools & Automation for Assurance Cases** Srivatsan Varadarajan, Honeywell Aerospace	**Computer-Aided Evaluation for Argument-Based Certification** Timothy Wang, Raytheon Technologies Research Center	**Towards the Certification of Neural Networks Using Overarching Properties: An Avionics Case Study** Michael Durling, GE Research

Multicore IMA **Chairs: Martin Halle, Sam Thompson** Track 5 ***S214***	**A Tool for Satisfying Real-Time Requirements of Software Executing on ARINC 653 with Undocumented Multicore** Bjorn Andersson, Carnegie Mellon University Software Engineering Institute	**Safe Usage of Multi-Cores in Neural Network Avionics Applications** Anika Christmann, Technische Universität Braunschweig, Institut für Datentechnik und Kommunikationsnetze	**Avionics Platform Design Optimization Considering Multi-/Many-Core Processors** Marius Rockschies, Hamburg University of Technology	**Evaluation of the Multicore Performance Capabilities of the Next Generation Flight Computers** Leonidas Kosmidis, Barcelona Supercomputing Center (BSC) and Universitat Politècnica de Catalunya (UPC)	
Modeling and Machine Learning **Chair: Max Friedrich** **Track 6** ***S216***	**HMI Design for Explainable Machine Learning Enhanced Risk Detection in Low-Altitude UAV Operations** Max Friedrich, DLR German Aerospace Center	**BERT-Based Topic Modeling and Information Retrieval to Support Fishbone Diagramming for Safe Integration of Unmanned Aircraft Systems in Wildfire Response** Seydou Mbaye, NASA Ames Research Center	**An Approach to Identifying Aspects of Positive Pilot Behavior Within the Aviation Safety Reporting System** Bryan Matthews, KBR, Inc. NASA	**Generation of RNP Approach Flight Procedures with an RRT* Path-Planning Algorithm** Raúl Sáez, Electronic Navigation Research Institute (ENRI)	**Runway Sign Classifier: A DAL C Certifiable Machine Learning System** Konstantin Dmitriev, Technical University of Munich

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CEST	15:30	16:00	16:30	17:00	17:30
Enhancing Capacity Chairs: Mark Cockburn, Erik Liljeroth Track 1 ***S215***	**Big Data-Driven Prediction of Airspace Congestion** Ítalo Romani de Oliveira, Boeing Research & Technology	**Machine Learning Airport Surface Model** Jeremy Coupe, NASA	**Using Sector Complexity Metrics to Predict Sector Capacity** Juan Rebollo, Mosaic ATM	**Predicting Deviation of Flight Entry Into Air Sector Using Machine Learning Techniques** Christian Klötergens, University Hildesheim	**Framework for Transparent, Explainable and Trustworthy Automation of ATM** Antonio Gracia-Berná, The Boeing Company
Trajectory Prediction Chairs: Junzi Sun, Dylan Hasson Track 1 ***S219***	**Improving Aircraft Trajectory Prediction Accuracy with Over-Sampling Technique** Seokbin Yoon, Korea Aerospace University	**Joint Strategic and Tactical Air Traffic Management of Arrival Flights at Tokyo International Airport for Reduced Climate Impact** Adriana Andreeva-Mori, Japan Aerospace Exploration Agency	**Bayesian Inference of Aircraft Operating Speeds for Stochastic Medium-Term Trajectory Prediction** Thomas Zeh, Technische Universität Dresden	**Machine Learning Approach for Aircraft Performance Model Parameter Estimation for Trajectory Prediction Applications** Aida Sharif Rohani, Universities Space Research Association	
UAS Operations Analysis Chair: Mats Martens Track 2 ***Sala d'Actes***	**Traffic Flow Analysis for Package Delivery Drones Using a Queueing Model** Krishna Kalyanam, NASA Ames	**Comparative Analysis of Airspace System Accessibility for Uncrewed Aircraft Systems for Regional Operations** Jordan Sakakeeny, NASA Ames Research Center	**Logical Architecture of a U-Space Laboratory in Germany** Kevin Dwinger, Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)		
UAS Detection Chair: Conrad Rorie Track 2 ***S208***	**Real-Time UAV and Payload Detection and Classification System Using Radar and Camera Sensor Fusion** Varunkumar Mehta, National Research Council Canada	**Explainability of Deep Reinforcement Learning Method with Drones** Ender Çetin, UPC	**Enhancing Counter Drone Operations Through Human-Ai Collaboration: A Hierarchical Decision-Making Framework** Varunkumar Mehta, National Research Council Canada	**A Hybrid Framework for Object Distance Estimation Using a Monocular Camera** Varunkumar Mehta, National Research Council Canada	
UAS Path Planning Chair: Alexander Kuenz Track 2 ***S213***	**A UAV Path Planning Method in Three-Dimensional Urban Airspace Based on Safe Reinforcement Learning** Yan Li, Beihang University	**Fixed-Wing UAV Path Planning and Collision Avoidance Using Nonlinear Model Predictive Control and Sensor-Based Cloud Detection** Jeremy Bertoncini, University of the Bundeswehr	**Minimal Communication Between Drones Using Guidance Vector Fields in Dense Airspace** Adrian del Ser, ENAC	**2.5D Route Planning for Unmanned Aircraft in a Windy Urban Environments Using Sustainability and Safety Metrics** Benjamin Lochow, Technische Universität Berlin	
Cyber Security Chair: Ryan Hale Track 3 ***S217***	**PSAT – A Package Structure Analyzation Tool to Regain Control of Hijacked Drones** Corinna Schmitt, University of the Federal Armed Forces Munich	**A Combined Link Layer Security Solution for FCI Datalink Technologies** Thomas Ewert, German Aerospace Center (DLR)	**Enhancing Cybersecurity for LDACS: A Secure and Lightweight Mutual Authentication and Key Agreement Protocol** Suleman Khan, Linköping University	**A "Man-in-the-Middle" Approach for Enhancing Legacy Safety-Critical Avionics Systems** Alejandro Gracia Bardají, Airbus Defence and Space GmbH	
Formal Methods Chair: Cesar Munoz Track 4 ***S218***	**Methodology of Combining Empirical Stress Testing and Formal-Methods Based Schedulability Analysis for Real-Time Multicore Software** Bjorn Andersson, Carnegie Mellon University Software Engineering Institute	**Assurance-Driven Design of Machine Learning-Based Functionality in an Aviation Systems Context** Ewen Denney, KBR / NASA	**An Analysis on Formal Models of Computation for the Avionics Systems Domain** Gabriel Duarte, Aeronautics Institute of Technology	**AACE: Automated Assurance Case Environment for Aerospace Certification** Timothy Wang, Raytheon Technologies Research Center	
IMA System Design Chair: Bastian Lüttig Track 5 ***S214***	**Optimization of Development Assurance Level Allocation** Kevin Delmas, ONERA	**Design Space Exploration for Safe and Optimal Mapping of Avionics Functionality on IMA Platforms** Rodolfo Jordao, KTH Royal institute of technology	**Zero Trust Avionics Systems (ZTAS)** Mehrdad Pakmehr, ControlX, Inc.	**Auto-Derivation of Functional Flow Block Diagrams from System Architecture Using the eSAM Method** Chris Watkins, Gulfstream Aerospace Corporation	**WebAssembly in Avionics** Wanja Zaeske, German Aerospace Center (DLR)

Human Factors Analysis **Chair: Michael Dorneich** Track 6 ***S216***	**Discrete-Fourier-Transform-Based Evaluation of Physiological Measures as Workload Indicators** Lothar Meyer, LFV	**DENJIN-KEIKAKU: A Contact Analog Approach to Aviation Autonomy** Kohei Funabiki, Japan Aerospace Exploration Agency	**Dry EEG-Based Mental Workload Prediction for Aviation** Laura Salvan, Thales Group		

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Technical Sessions - Thursday, October 5, 10:30-12:30

CEST	10:30	11:00	11:30	12:00
Flight Planning Chair: Carmo Kluenker Track 1 ***S215***	**Reroute Prediction Service** Ítalo Romani de Oliveira, Boeing Research & Technology	**Stochastic Flight Plan Optimization** Ítalo Romani de Oliveira, Boeing Research & Technology	**Flight Planning for HAPS ATM Integration** Andrés Arango Pérez, Technische Universität Braunschweig	**Flight Efficiency Solutions to Support Global Sustainability Goals** Vinayak Gaonkar, Boeing Company
UAV/UAS/UTM Chairs: Junzi Sun, Anton Conte Track 1 ***S219***	**Exploring Tower Control Strategies for Concurrent Manned and Unmanned Aircraft Management** Dominik Janisch, TU Delft	**A Hybrid Quantum-Classical Machine Learning Approach to Vision Sensor Data Analysis in Aerospace Applications** Mohammed Syed, The Boeing Company	**Analysis of DAA Well Clear Criteria Using the Flown Trajectories** Jaeyoung Ryu, Inha University	**Flight Data Driven Prediction for Drone's Health Degradation by Assessing the Continuous Large-Angle Turns** Xinting Hu, Nanyang Technological University
AAM Operations 2 Chair: Marc Brittain Track 2 ***Sala d'Actes***	**Study on Urban Air Mobility Corridor Design in the Vicinity of Airports** Daichi Toratani, Electronic Navigation Research Institute	**Vertiports Task Areas and Functional Sequences for Basic Operations in Urban Space** Stephanos Papakonstantinou, Technical University of Hamburg, Institut of Air Transportation Systems	**Airspace Performance Observations of Scalable Autonomous Operations in a High Density Vertiplex Simulation** Madison Goodyear, San Jose State University Research Foundation	**Strategic Path Planning for High Density Operations in Unstructured and Partially Structured Urban Airspace** Giancarmine Fasano, University of Naples Federico II
Military Applications Chair: Ali Raz Track 2 ***S208***	**Bridging the Gap: Applying Argument to MIL-HDBK-516C Certification of a Neural Network Controller Guarded by ASIF Run Time Assurance** Jonathan Rowanhill, Dependable Computing	**Analyzing RL Agent Competency in Air Combat: A Tool for Comprehensive Performance Evaluation** Emre Saldiran, Cranfield University	**An Evolutionary Reinforcement Learning Approach for Autonomous Maneuver Decision in One-to-One Short-Range Air Combat** Baris Baspinar, Istanbul Technical University	
Human-Machine Teaming 2 Chair: Max Friedrich Track 2 ***S213***	**Remote Pilot Handoffs in Large UAS Multi-Vehicle Operations: Best Practices and Supportive Technologies** Cynthia Wolter, SJSU Research Foundation at NASA Ames Research Center	**Innovative Low-Cost Design of a Ground Control Station for Unmanned Aerial Systems Experimentation** Luca Garbarino, Italian Aerospace Research Centre		
Drone Communications and Security Chairs: Kai Guo, Lennart Jansen Track 3 ***S217***	**CerDES - A Certificateless Dtls-Based Encryption Solution for IEEE 802.15.4 Drone Communications** Corinna Schmitt, University of the Federal Armed Forces Munich	**Blockchain-Enabled Federated Learning with Neuromorphic Edge Devices for Drone Identification and Flight Mode Detection** Alex Henderson, Southwest Reserach Institute	**Authenticating Civil UAV Communications with Post-Quantum Digital Signatures** Ridwane Aissaoui, National School of Civil Aviation	**Communications Concept Architecture for Uncrewed Aircraft Cargo Operations** Rafael Apaza, NASA Glenn Research Center
Fault Detection Chair: Sheila Conway Track 4 ***S218***	**An Approach for Defining Faults in MIL-STD-1553 Bus in an Avionics Architecture** Huseyin Sagirkaya, Avionics and Electrical Engineering Turkish Aerospace	**Verifiable Computing in Avionics for Assuring Computer-Integrity Without Replication** Johannes Reinhart, Institute of Aircraft Systems, University of Stuttgart	**UAV Fault and Anomaly Detection Using Autoencoders** Raju Dhakal, Embry-Riddle Aeronautical University	
Navigation and Guidance Chair: Jordan Sakakeeny Track 3 ***S214***	**Radar-Visual Navigation for All-Weather Approach and Landing to Vertiports** Paolo Veneruso, University of Naples Federico II	**Camera Autocalibration Using Predominantly Planar Aerial Imagery** Marta Palomar, Boeing Aerospace Spain		
Human Factors with Sensor Processing Chair: Ondrej Mach Track 6 ***S216***	**Using Informative AI to Understand Camouflaged Object Detection and Segmentation** Timothy Sharp, 76 SWEG USAF	**Scene-Linked Gain Adjustment of LWIR Image** Kohei Funabiki, Japan Aerospace Exploration Agency	**Real-Time Resident Space Object Surveillance Using Distributed Satellite Systems** Roberto Sabatini, Khalifa University of Science and Technology	

CEST	13:30	14:00	14:30	15:00
Fuel Efficient Operations **Chairs: Henrik Hardell, Mark Cockburn** Track 1 ***S215***	**Aircraft Taxi Time Prediction Using Machine Learning and its Application for Departure Metering** Eri Itoh, Electronic Navigation Research Institute/The University of Tokyo	**Weather-Optimized Individual Routes in a Global Scenario** Alexander Kuenz, DLR German Aerospace Center		
AAM Case Studies **Chair: Chester Dolph** Track 2 ***Sala d'Actes***	**Hierarchical Vertiport Network for an Urban Air Mobility System: Munich Metropolitan Area Case Study** Magdalena Peksa, Technical University of Munich	**Developing a Digital Twin for Testing Multi-Agent Systems in Advanced Air Mobility: A Case Study of Cranfield University and Airport** Anurag Mukherjee, Cranfield University	**Simulation of Strategic Conflict Management Performance for Advanced Air Mobility Operations** Wallace Souza, Aeronautics Institute of Technology (ITA)	**Vertiport Locations Optimization in Discrete Search Space** Munhyun Chae, Korea Aerospace University
Safety and Certification 2 **Chair: Jean-Guillaume Durand** Track 2 ***S208***	**Safety Expertise and the Perils of Novelty** Mallory Graydon, NASA Langley Research Center	**Simulating Safety and Efficiency Impacts of Airspace Constraints in U-Space Airspace** Antony Evans, Airbus UTM	**Population Density Estimation for Dynamic Ground Risk Assessment of Drone Operations** Xinting Hu, Nanyang Technological University	**Evaluation of the Technical Value of Powertrain Systems to Enable Safe Performance-Based Flight Guidance for Urban Air Mobility** Nabil Hagag, German Aerospace Center (DLR)
Flight Technologies **Chair: Roberto Sabatini** Track 2 ***S213***	**A Concept of Operations for Power Beaming of Electric Air Vehicles** Kapil Sheth, NASA	**Using ADSB Data to Analyze the Potential for Nuisance in a Ground Collision Avoidance System** Loyd Hook, University of Tulsa	**Assessing Performance of Radar and Visual Sensing Techniques for Ground-to-Air Surveillance in Advanced Air Mobility** Federica Vitiello, University of Naples "Federico II"	
Future Data Link LDACS **Chair: Corinna Schmitt** Track 3 ***S217***	**L-DACs Mobility Management in ATN/IPS Network: Design, Prototyping, and Evaluation** Hao Yu, Beihang University	**Improving the Lifespan of LDACS Air-to-Air Multi-Hop Connections by Heading Direction** Leonardus Jansen, German Aerospace Centre (DLR)	**Impact of DME Interference on LDACS Channel Estimation in En-Route Phase** Jiaqi Zhou, Beihang University	
DO 178-C Compliance **Chair: Zamira Daw** Track: 4 ***S218***	**Certification Considerations of Software-Defined Radio Using Model-Based Development and Automated Testing** Lin Bao, École de Technologie Supérieure	**Automating Airborne Software Certification Compliance Using Cert DevOps** Chris Hubbs, Collins Aerospace	**Automated DO-178C Compliance Summary Through Evidence Curation** Michael Durling, GE Research	**Automated Testing of ARINC 661 Cockpit Display Systems: Factors to Accelerate DO-178C Certification** François Couadau, Ansys France SAS
Operator Support **Chair: Jiri Novak** Track: 6 ***S216***	**Collaborative Agents for Synthetic Tactical Training** Jiří Hanák, Brno University of Technology	**Reinforcement Learning-Based Pilot Assistance System for Management of Failures** Carlos Ribeiro, Instituto Tecnológico de Aeronáutica	**A Study of Knowledge Exchange in Handover for the Urban Air Mobility** Thomak LEDUC, THALES AVS FRANCE	**Vestibular Apparatus Training in Czech Air Force Analysis and Opportunities** Ondrej Mach, University of Defence, Czechia

CEST	16:00	16:30	17:00	17:30
Information-centric Operation Concepts **Chair: Karl-Johan Klang** Track 1 ***S215***	**Application of the Connected Aircraft for Trajectory Information Exchange** Stephane Mondoloni, The MITRE Corporation	**Airspace User-Air Traffic Control Information Exchange Using Mobile Devices to Enhance the Future Info-Centric National Airspace System** Joey Menzenski, The MITRE Corporation	**Roadmap to Cooperative Operating Practices for Strategic Conflict Detection and Resolution in the Upper Class E Traffic Management Concept** Connie Brasil, SJSURF/NASA	
AAM/UAS Trajectory Management **Chair: Natasha Neogi** Track 2 ***Sala d'Actes***	**Demonstrating a Cloud-Enabled Flight Management System** Todd Kilbourne, Mosaic ATM, Inc.	**Distributed Trajectory Management for Urban Air Mobility Operations with Ground-Based Edge Intelligence** Ivan Petrunin, Cranfield University	**Initial Study of Tailored Trajectory Management for Multi-Vehicle Uncrewed Regional Air Cargo Operations** Jordan Sakakeeny, NASA Ames Research Center	**Trajectory-Based State-of-Charge Prediction Using LSTM Recurrent Neural Networks** Adan Vela, University of Central Florida
Artificial Intelligence/Machine Learning **Chairs: Kevin Dwinger, Juan Rebollo** Track 2 ***S213***	**Efficient Determination of Safety Requirements for Perception Systems** Sydney Katz, Stanford University	**Formal and Practical Elements for the Certification of Machine Learning Systems** Jean-Guillaume Durand, Xwing, Inc.	**Reinforcement Learning Based Assistive Collision Avoidance for Fixed-Wing Unmanned Aerial Vehicles** Francesco d'Apolito, AIT Austrian Institute of Technology	**Real-Time Vision-Based Control of SWaP-Constrained Flight System with Intel Loihi 2** Steven Harbour, Southwest Research Institute
Surveillance Systems and Technologies **Chair: Rafael Apaza** Track 3 ***S217***	**Alternative Sources for Extended Projected Profile Data for the Connected Aircraft** Ryan Hale, The Boeing Company	**Aireon Space Based Aircraft Position Validation and Multilateration Solution** John Dolan, Aireon	**Conflict Detection Performance of Ground-Based Radar Networks for Urban Air Mobility** Rosario Aievola, Collins Aerospace - ART	**Position Performance Analysis of Airport Surface Multilateration** Fengxun Gong, Civil Aviation University of China
Operating Environments for Aviation Software **Chair: Chris Brinton** Track 4 ***S218***	**Avionics Linux** Steve VanderLeest, Boeing	**Enabling Linux in Aerospace Applications** Steve VanderLeest, Boeing	**Insights from Preliminary Analysis of Local Cache Performance in COTS RTOS for Multi-Core Processors** William Vance, Trivector Services, Inc.	

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Posters - Tuesday, October 3, 18:00-20:00

Poster Area 1 Chair: Omar Garcia Crespillo *Foyer*	Poster Area 2 Chair: Dongsong Zeng *Foyer*	Poster Area 3 Chair: Christopher Camargo *Foyer*	Poster Area 4 Chair: Robert Heidinger *Foyer*
Prediction of Aircraft Delay at Busy Airport Considering Weather Information with Machine Learning Techniques Kangmin Lee, Korea Aerospace University	**Cooperative Path-Following Control of Fixed-Wing UAV Swarm Under Communication Delay** Văn Thiêm Phạm, Unmanned Aerial Center, VHT, Viettel Group	**A Novel Semantic Representation of Airport Surface Trajectory for Taxiing Pattern Recognition** Minghua Zhang, Beihang University	**Adopting Automotive Software Technology to Aviation Through a Comparative Analysis of Software Development Standards** Donghyun Lee, Hyundai Motor Company
Advanced Autoplanner 2 - A Proposed AI Supported Tool for ATM Billy Josefsson, LFV, Sweden ANSP	**Performance Comparison of Deep Learning Networks for Runway Recognition in Small Edge Computing Environment** Hyunjee Ryu, Hyundai Motor Company	**A Study on Airport Access Mode Choice Behavior Using Mobile Data - Case of Incheon International Airport** Eunji Kim, Korea Aerospace University	**Implementation of an Automated Voice-Checklist in General Aviation Aircraft** Vedant Ruia, Georgia Institute of Technology
Short-Term Aircraft Trajectory Prediction Considering Weather Effect Shuai Feng, School of Electronics and Information Engineering Beihang University Beijing, China	**A Vision-Based Approach to Autonomous Landing of an eVTOL Aircraft in GPS-Denied Environments** Fernanda Villafana Benitez, Wisk Aero & Embry Riddle Aeronautical University	**Case-Based Decision Making for Diversion Scenarios** Carlos Ribeiro, Instituto Tecnológico de Aeronáutica	**Standard Compliant Requirements-Based Development of a Multilevel Battery Controller for Aerospace Applications** Purav Panchal, Universität der Bundeswehr München
	Noise-Optimal Arrival Route Planning for Operations of Multiple Unmanned Aerial Vehicles Hanyao Hu, Purdue University		**New Design Optimization Methodologies of Aeronautic Boards Embedding SERDES Up to 40 Gbps: Tradeoff Between Performance and Cost** Soazig Le Bihan, IMS Bordeaux
	Air-to-Air Simulated Drone Dataset for AI-Powered Problems Varunkumar Mehta, National Research Council Canada		

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