Abstract
Panel: Challenges of AI Certification

Christoph Torens, Pranav Nagarajan
DLR Institute of Flight Systems
christoph.torens@dlr.de , pranav.nagarajan@dlr.de

The utilization of artificial intelligence (AI) is growing throughout all domains. There is strong demand for the use of AI in the aviation domain. With AI, there is a huge potential for automating complex tasks, e.g., vision-based tasks to support the landing operation. The overall goal is to improve the performance of operations, and increase the number of operations, while at the same time reducing the cost of operation, and also maintain and increase safety [1]. This implies following rigorous certification standards. This is a challenge, because traditional standards and processes for certification do not fit the new paradigm of data-driven designs of AI components [2]. In traditional software, the behavior is determined by software design and software algorithms. This enables a coherent and bidirectional traceability from requirements, over design, to software source code, executable code and tests [3, 4]. However, with AI systems the behavior is determined to a large degree by the data that was used for training. Using different data results in different behavior. As a result, the same rigor that is used for software development is also required for the data handling. The requirements for data quality, the characterization of the data, as well as the overall development lifecycle needs to be considered [5, 6]. This is just one of the challenges that emerge with the AI software.

This panel is targeted towards the certification challenges of AI systems for aviation. The panel will invite speakers on the topic of AI certification and the challenges regarding that topic. Targeted topic areas include: gaps of existing standards, standardization groups and efforts towards new standards, research perspectives on trustworthy AI, industry perspectives on AI utilization, safety monitoring and assurance of AI systems, environmental conditions and operational design domain of AI systems, and more. The authors of this abstract will be the moderators of the panel. As invited panelists, we are proud to present our highly valued guests: Guillaume Soudain (EASA), Burak Ata (Helsing GmbH), Konstantin Dmitriev (TUM), and Umut Durak (DLR). We kindly refer to the biography for further information.

[1] EASA, Artificial Intelligence Roadmap 2.0: Human-centric approach to AI in aviation, European Union Aviation Safety Agency (EASA), May 2023.
[2] EASA, EASA Concept Paper: Guidance for Level 1 & 2 Machine Learning Applications, European Union Aviation Safety Agency (EASA), Mar. 2024
[3] Torens, Durak, and Dauer. (2022) Guidelines and Regulatory Framework for Machine Learning in Aviation. In: AIAA Science and Technology Forum and Exposition, AIAA SciTech Forum 2022. AIAA SCITECH 2022 Forum, 2022-01-03 - 2022-01-07, San Diego, California. ISBN 978-162410631-6.

[4] Dmitriev, Schumann and Holzapfel, "Towards Design Assurance Level C for Machine-Learning Airborne Applications," 2022 IEEE/AIAA 41st Digital Avionics Systems Conference (DASC), Portsmouth, VA, USA, 2022, pp. 1-6, doi: 10.1109/DASC55683.2022.9925741.
[5] Kaakai, Adibhatla, G. Pai, and E. Escorihuela, “Data-Centric Operational Design Domain Characterization for Machine Learning-Based Aeronautical Products,” in Proc. of SafeComp, Toulouse, France, Sep. 2023, pp. 227–242.
[6] Kaakai, Fateh, et al. Toward a machine learning development lifecycle for product certification and approval in aviation. SAE International journal of aerospace, 2022, 15. Jg., Nr. 01-15-02-0009.

Biography

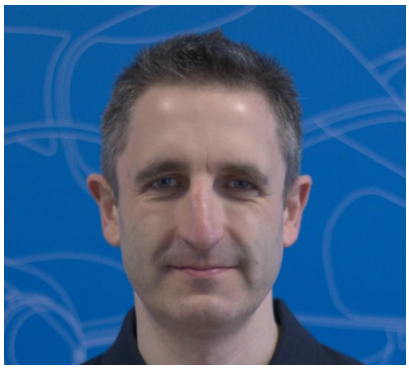
Panelists

Guillaume Soudain

Guillaume Soudain has been working for EASA since 2006, first as ‘Software and Airborne Electronic Hardware Expert’ in the Agency's Certification Directorate. In 2014, he was appointed ‘Software Senior Expert’, in charge of the coordination of software aspects of certification within the Agency, before taking his current role of ‘EASA AI Programme Manager’ in 2022.
Since 2018, he has been at the forefront of driving innovation and ensuring safe deployment of AI in aviation through his leadership of EASA's AI Roadmap. He also represents EASA in the joint EUROCAE WG-114 / SAE G-34 working group on AI.
Before joining EASA, Guillaume worked for 5 years, from 2001 to 2006, as a ‘Software Engineer’ in the development of automatic flight control systems in the European rotorcraft industry.

Burak Ata

Burak Ata serves as the Head of Certification and Assurance at Helsing. His primary areas of expertise encompass airworthiness certification and quality assurance within both civilian and military programmes. In addition to his role at Helsing, Burak Ata co-chairs EUROCAE WG-117, which focuses on Aviation Software standards.



Konstantin Dmitriev

Konstantin Dmitriev is a Research Associate at the Technical University of Munich and a Certification Engineer at MathWorks. He is a member of the SAE G-34 / EUROCAE WG-114 working group developing the ARP6983 standard for AI certification. His professional interests include the safety and certification of artificial intelligence and machine learning systems.

Umut Durak

Umut Durak is the deputy head of the Safety Critical Systems and Systems Engineering Department at the German Aerospace Center (DLR) Institute of Flight Systems. He also holds a professor title from the Institute of Informatics at the Clausthal University of Technology. His research focus lies in software intensive airborne systems.

Moderators

Christoph Torens

Christoph Torens is a researcher at the DLR Institute of Flight Systems, Department Unmanned Aircraft, Safe Autonomy Group. His research focuses on the connection of software standards, certification, and the safe operation of autonomous unmanned aircraft systems.

Pranav Nagarajan

Pranav Nagarajan is a Research Scientist at the Institute of Flight Systems of the German Aerospace Center (DLR) in Braunschweig. There, he works in the Department of Unmanned Aircraft towards the development of safe autonomous systems for drones primarily in the EASA specific and certified categories.