3rd Workshop on Avionics Systems and Software Engineering (AvioSE'21)

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Abstract: Software development in the aerospace domain is driven by new application potentials, increasing complexity, rising certification effort, and increasing cost pressure. In particular, future applications such as e.g., autonomous air transport, aircrew workload reduction, commercial UAVs, and further enhancement of existing functionality add to the system complexity. At the same time, there are challenges in communication and navigation in airspace, certification for multi-core processors, artificial intelligence as well as security for software, hardware, and connectivity. New software development methodologies and techniques are required for dealing with these challenges.

Keywords: avionics; systems engineering; software engineering; formal method; model-based; requirement; qualification; certification; simulation; process; tool

1 Introduction

Considerable advances for aerospace applications are expected in the course of introduction of new technologies such as artificial intelligence (AI), multi-core processors, and new communication technologies. However, the requirements in the domain do not allow the application of these technologies straight away, but require for additional techniques and mechanisms in order to meet the high quality needed for product certification. Many of the existing techniques can be amended or extended towards fulfillment of these requirements. These challenges are to be addressed in addition to the progress to be made in development efficiency and quality assurance. The previous workshops AvioSE'19[4] and AvioSE'20[5] dealt with general challenges and development tools. They demonstrated that many participants were in favour of generic aspects, but also wanted a deeper dive in carefully selected areas with significant future potential.

To this end, **future capabilities driven by AI** is selected for AvioSE'21 as the main topic. Starting with the collection of capabilities that can be enabled or improved with AI, it shall be figured out afterwards which areas of development require attention. For the virtual

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[4] Annighoefer et al., 1st Workshop on Avionics Systems and Software Engineering (AvioSE'19), 2019. Annighoefer et al., Challenges and Ways Forward for Avionics Platforms and their Development in 2019, in IEEE/AIAA 38th Digital Avionics Systems Conference (DASC), 2019.

[5] Annighoefer et al., 2nd Workshop on Avionics Systems and Software Engineering (AvioSE'20)

discussion it is envisaged to cover fields such as the certification of AI, need and possibilities of Design Assurance Level segregation or performance assurance.

2   Workshop Objectives

The main objective of the workshop is to accelerate the transfer of knowledge between academia and industry. This workshop provides the enabling platform for the stakeholders to discuss technical, but also process, and educational topics.

The objectives of AvioSE'21 are three-fold: (1) It provides a forum for researchers from both academia and industry to present new methods, tools, and technologies from avionics systems and software engineering, e.g. model-based development, requirements engineering, formal methods, model-based methods, and virtual methods. Those contributions are presented in a scientific format, but the small character of the workshop allows detailed discussion. (2) **Future capabilities driven by AI** are selected to be the main topic of AvioSE'21. This is addressed interactively by inviting all participants to discuss aspects of AI. This covers connecting academics and professionals with invited experts. The panel discussion with invited experts from academia, industry, and authorities supports the identification of most important aspects in this area and propose ways how to address them. The proposals are at the same time challenged and/or amended by workshop participants. The results are collected on virtual desktops and are available to all participants. (3) The AvioSE'21 also allows for a wild card topic that might show up during the workshop.

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