

# Software Discipline

## Submission Guidelines

Please submit full draft papers or 5 page extended abstracts by the June submission deadline using the “Submit a Paper” link at <http://www.aiaa-scitech.org>.

All abstracts will be evaluated by qualified individuals from industry, academia or government, and reviewer comments will be returned to the authors. The Software TC is interested in high-quality papers and is therefore emphasizing this extra review step. Additionally, the Software TC is continuously improving its review process.

## Proposals for Special Topic Sessions, Panel Discussions

Proposals for special sessions or panel discussions on other important and emerging topics of interest are also welcome. Please see <http://www.aiaa-scitech.org> for instructions on proposing special topic sessions. Email [jim.murphy@nasa.gov](mailto:jim.murphy@nasa.gov) to propose panel discussions.

## Joint Sessions

For SciTech 2019, the technical committees are intensifying their efforts to bridge between multiple disciplines; therefore a number of joint sessions will be organized. For the software discipline the following joint sessions with intelligent systems and unmanned systems are planned.

- Interaction of Software Assurance and Risk Assessment Based Operation of UAS [joint session: Unmanned Systems, Intelligent Systems, Software]
- Cybersecurity in Aerospace Systems [joint session: Intelligent Systems, Software]
- Unmanned systems mission management, coordination, planning, and autonomy [joint session: Unmanned Systems, Intelligent Systems, Software]

## Software Topic Areas of Interest

Papers are sought in the area of software and software-intense systems. We are soliciting papers for three main topics. Topics include, but are not limited to the corresponding listed items.

### ***Software Modeling and Architecture:***

Papers are sought in the area of software architecture for aerospace systems. Specific areas of interest include, but are not limited to:

- Open architectures
- Failsafe architectures
- Commercial of the shelf software (COTS)
- Verification and validation as well as certification considerations for software
- Software reuse in practice
- Modeling of software architecture
- Role of architecture within verification
- New concepts in software architecture
- Architectural definition

### ***Software Challenges in Aerospace Symposium:***

In the 6<sup>th</sup> Software Challenges in Aerospace symposium, we will again bring together experts at the intersection of aerospace and computer science. We will focus on software for flight operations (both on the vehicle and ground), and place a priority on the design and analysis of software-intensive aerospace systems for safety assurance. The goal of this symposium is to foster innovation and discussion across the divide between the two academic communities. We place an emphasis on demonstrable research on real-world applications, with clear extensions to aerospace software. The Software Challenges in Aerospace Symposium specifically targets high-quality papers with a high degree of formality for software modeling and analysis. Authors of selected high-quality papers may be invited to extend their papers for a special issue of the Journal of Aerospace Information Systems.

We invite papers of the following types:

- Papers that clearly describe gaps in the capabilities or policies related to aerospace software, and that illuminate frontiers where research will be necessary in order to make progress.
- Papers which push the boundaries and deliver results in software intensive systems, highlighting techniques that enable the intelligent and efficient management of system complexity.

The topics covered by this workshop include the following:

#### *Software Synthesis for Aerospace*

- Model-based approaches to software and software-intensive system design
- Compositional and hierarchical design approaches for reducing and managing complexity
- Approaches to building intelligent and adaptive systems within a safety- critical framework
- The generation of code that is correct-by-construction

- The design of maintainable systems

#### *Software Analysis for Aerospace*

- Verification and validation for safety-critical software systems
- Security analysis for aerospace communications
- Compositional analysis of code for scalability
- Model-based Testing, Formal Methods, Run-Time Monitoring
- Statistical techniques (including data mining and learning) for program and software behavior analysis

#### *Aerospace System Integration*

- Architectures for safety-critical aerospace systems containing software, hardware and people
- Approaches to, benefits of, and limitations of Integrated Modular Avionics frameworks
- Human-computer interaction including intelligent cockpits/control towers
- Adaptive airspace implementations

#### *Aerospace Software Policy and Implementation*

- The certification of software systems, including DO-178, DO-278, and safety-case based approaches
- Decision-making in air systems, including both autonomy and human factors issues
- Creating and maintaining a skilled workforce for aerospace software

### ***Interaction of Software Assurance and Risk Assessment Based Operation of UAS (joint session with Unmanned Systems, Intelligent Systems):***

Due to the interoperation of the pilot on the ground, levels of autonomy on board the aircraft, and the communication/control link, Software Assurance is a critical aspect of assessing risk for operating unmanned aircraft. Specific areas of interest include, but are not limited to:

- Software Assurance levels of UAS sub-systems
- Techniques for assessing operation and system/subsystem risk

### ***Cybersecurity in Aerospace Systems (joint session with Intelligent Systems):***

Important aspects of aircraft, especially of unmanned aircraft, are system resilience and robustness due to increasing levels of automation and autonomy as well as a need for data and control link. Specific areas of interest include, but are not limited to:

- Safety/security requirements engineering, and cybersecurity best practices
- Fail-safe techniques, runtime monitoring, implications of runtime monitoring for certification, health monitoring, situational awareness, security aspects
- Contingency and mitigation techniques

### ***Unmanned systems mission management, coordination, planning, and autonomy (joint session: Unmanned Systems, Intelligent Systems, Software):***

The separation of the aircraft and pilot for Unmanned systems brings additional challenges for managing, planning, and coordination of the flight. In addition, increasing levels of autonomy support unmanned flight, but require additional coordination with the pilot. Areas of interest include:

- Coordination between the pilot and on-board Automation
- Mission planning and flight management tools