Winter 2022

IAF SPACE SYSTEMS TECHNICAL COMMITTEE

1. Introduction

The Space Systems Committee addresses space systems as a whole from a system concept and system engineering perspective. The Committee's aim is two-fold. Firstly, to focus on the enhancement of system development and reliability, including collection of lessons learned, development of tools, processes and training in the field of systems engineering to further improve the efficiency, risk management, reliability and coordination across disciplines and all the functions necessary to build any space systems. Secondly, to highlight future developments, especially in the fields of innovative and mission-enabling technology, future system architectures and innovative and visionary system concepts.

2. Summary

The attendance to the Space Systems Symposium held during the International Astronautical Congress (IAC) 2022 in Paris, France was record high along all the six sessions and the interactive presentations.

3. Highlights

The following highlights have been selected among the most significant papers presented in Paris:

- Moon Diver, a JPL mission proposing to investigate the Mare tranquillitatis pit, leveraging pinpoint landing enabled by closed-loop guidance with terrain-relative navigation and robotic access to the pit near-vertical wall with an instrument package to examine the chemistry, mineralogy, and morphology of these bedrock layers (Paper ID: 73136.)
- Oxford Space Systems' innovative origami-inspired X-Band SAR reflect array antenna for small satellites down to 50 kg (Paper ID: 73133.)
- The Development of a workflow to conduct thermal analyses from the open-source MBSE tool Virtual Satellite (VirSat) (Paper ID: 70017.)
- University of Alabama in Huntsville, developed a Mission Planning Ontology with strong semantic relationships connected to mission planning to derive both a mission architecture and process framework to reduce early workload in project formation (Paper ID: 68782.)
- INPE developed a framework capable of evaluating AIT readiness for complex spatial systems according to the stakeholders' requirements (Paper ID: 68137.)
- The European Space Agency (ESA) and Airbus outlined the process leading to the in-flight update of Solar Orbiter's flight software and the improvement of its fine pointing mode (Paper ID:71074.)
- Caltech/JPL highlighted Galileo probe lessons learned relevant to the design, concept of operation, instrumentation, technologies, and scientific objectives of future Giant Planet entry probe missions (Paper ID:6982.)
- JAXA is currently working to reduce the finite time resource of crew members on the ISS by developing a free-flying robot, Internal Ball Camera (Int-Ball) to conduct photography tasks instead of crews (Paper ID:69912.)
- Uncertainty-aware learned non-parametric dynamics models are used for state estimation filtering and model predictive control with potential applications in space debris removal and on-orbit assembly and servicing (Paper ID:69089.)

4. Future outlook

The committee is currently made of 26 members, including young professionals, and with good distribution among geographical areas (representing 12 countries) and categories (industry, academia and agencies).

The IAF Space Systems Technical Committee is chaired by Jill Prince (NASA). Tibor Balint (JPL) and Reinhold Bertrand (ESA) act as Vice-Chairs.

In Paris, the Committee welcomed two new members:

- Sapna Rao (Lockheed Martin)
- Tim Cichan (Lockheed Martin)

During IAC 2022, Committee member Audrey Berquand participated as panelist at the NextGen Plenary #AI4Space, advocating for Natural Language Processing and Knowledge Graphs applications in the space field

Audrey Berquand at the NextGen Plenary at IAC 2023