

Special Session *on* Computational Intelligence in Space and Aerospace

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Session Organisers

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Important Dates:
15th January 2024 – Paper
Submission
15 March 2024 Paper
Acceptance Notification
1 May 2024 Final Paper
Submission & Early
Registration Deadline

Scope and Motivations

In an expanding world with limited resources and increasing complexity, optimisation and computational intelligence become a necessity. Optimisation can turn a problem into a solution and computational intelligence can offer new solutions to effectively make complexity manageable. All this is particularly true in space and aerospace where complex systems need to operate optimally often in harsh and inhospitable environment with high level of reliability. In Space and Aerospace Sciences, many applications require the solution of global single and/or multi-objective optimization problems, including mixed variables, multi-modal and non-differentiable quantities. From global trajectory optimization to multidisciplinary aircraft and spacecraft design, from planning and scheduling for autonomous vehicles to the synthesis of robust controllers for airplanes or satellites, computational intelligence (CI) techniques have become an important – and in many cases inevitable – tool for tackling these kinds of problems, providing useful and non-intuitive solutions. Not only have Aerospace Sciences paved the way for the ubiquitous application of computational intelligence, but moreover, they have also led to the development of new approaches and methods.

Session Topics

This special session intends to collect many, diverse efforts made in the application of computational intelligence techniques, or related methods, to aerospace problems. The session seeks to bring together researchers from around the globe for a stimulating discussion on recent advances in computational intelligence methods for the solution of space and aerospace problems.

Authors are invited to submit papers on one or more of the following topics:

- ▶ AI and Machine Learning for Space Applications
- ▶ Global trajectory optimization
- ▶ Multidisciplinary design for space missions
- ▶ Formation and constellation design and control
- ▶ Optimal control of spacecraft and rovers
- ▶ Planning and scheduling for autonomous systems in space
- ▶ Multiobjective optimization for space applications
- ▶ Resource allocation and programmatics
- ▶ Evolutionary computation for Concurrent Engineering
- ▶ Distributed global optimization
- ▶ Mission planning and control
- ▶ Robust Mission Design under Uncertainties
- ▶ Intelligent search and optimization methods in aerospace applications
- ▶ Image analysis for Guidance Navigation and Control
- ▶ Autonomous exploration of interplanetary and planetary environments
- ▶ Implications of emerging AI fields such as Artificial Life or Swarm Intelligence on future space research
- ▶ Intelligent algorithms for fault identification, diagnosis and repair
- ▶ Intelligent control for aerospace systems
- ▶ Multi-agent systems approach and bio-inspired solutions for system design and control
- ▶ Autonomous vehicles and autonomous air traffic management
- ▶ AI for Space Safety and Sustainability
- ▶ Intelligent interfaces for human-machine interaction
- ▶ Knowledge Discovery, Data Mining and presentation of large data sets
- ▶ Generative AI
- ▶ Explainable and Robust AI
- ▶ LLMs applied to space applications

Submission Guidelines

Manuscripts should be prepared according to the standard format of regular papers specified in IEEE WCCI2024. Paper submission is online through the WCCI2024 submission website <https://2024.ieeeewcci.org/authors/call-for-papers>. Papers submitted for these session will be peer-reviewed with the same criteria used for other contributed papers. All accepted papers in the special sessions will be included in the published conference proceedings. Selected papers will be submitted to a special issue of Expert Systems