

 <small>Institut Supérieur de l'Aéronautique et de l'Espace</small>	INTERNSHIP 5-6 MONTHS YEAR 2023
Internship tutor: Emmanuel BENARD emmanuel.benard@isae-superaero.fr	Internship with ISAE SUPAERO – Toulouse Targeted level: final year of Diplôme d'Ingénieur or MSc in Aerospace-Mechanical Engineering Grant: standard ISAE-SUPAERO rates, approx. 600 euros/month

Development of a branch of the Overall Aircraft Design FAST-OAD code: incremental developments and training framework

Context:

ISAE-SUPAERO is an institute dedicated to aerospace engineering higher education and research. ISAE-SUPAERO develops a research focused on the future needs of aerospace or high-tech industries. The ISAE-SUPAERO Department of Aerospace vehicles design and control (DCAS) supports activities related to the design and development of aerospace systems. The internship subject is within the scope of the chair AIRBUS-ISAE CEDAR II for Eco-Design of Aircraft. This chair is intended to conduct different actions in order to contribute to the sustainable development of future air transportation, taking into account the many dimensions of that ambition (environment, society, economic & industrial issues ...).

Objectives:

This internship proposes to develop a new branch of the group's preliminary aircraft design open-source code, FAST-OAD (<https://github.com/fast-aircraft-design/FAST-OAD>), jointly developed with ONERA [1]. The specific target of the internship is (a) to respond to Airbus interest in raising awareness on evaluating the impact of incremental changes (such as fuselage stretch, wing extension, aerodynamic or engine improvements...) through modifications of the existing FAST-OAD framework, (b) to initiate a new code branch specifically dedicated to training (as opposed to purely research-driven FAST-OAD branch).

Missions:

- Evaluate requirements in relation to evaluation of incremental changes at preliminary aircraft design stage;
- Review initial developments, obtained in 2022 [2];
- Set-up required modifications of the existing FAST-OAD code in order to respond to the requirements;
- Implement new code logics (Python) and to document changes (use of Jupyter notebooks);
- Test the new capability on a selection of use cases (fuselage stretch, change of engine...);
- Benchmark training strategies used in aircraft design education;
- Explicit the list of requirements for a new open source, based on FAST-OAD, specifically tuned for training purposes;
- Organize training sessions to raise awareness on those new code branches;
- Prepare a conference paper on the topic.

[1] David, C., Delbecq, S., Defoort, S., Schmollgruber, P., Benard, E., & Pommier-Budinger, V. (2021). From FAST to FAST-OAD: An open source framework for rapid Overall Aircraft Design. In IOP Conference Series: Materials Science and Engineering (Vol. 1024, No. 1, pp. 012062). IOP Publishing.

[2] SY, O. (2022). Development of a branch of Overall Aircraft Design FAST-OAD code: incremental developments and training framework. ISAE-SUPAERO Internship. EASN-2022 Conference.

REQUIRED SKILLS

Skills : Python programming (essential) and code documentation, knowledge of Aircraft Design (essential), reporting (English)

Soft skills : Autonomy, reporting & scheduling, curiosity, knowledge of Aviation