On adapting the Super-Efficient Global Optimization solver to handle mixed-variables, with applications in aircraft design.

Keywords: Bayesian optimization, mixed variables, multi-disciplinary optimization.

Location: ISAE-SUPAERO.

Duration: 5 to 6 months, starting as soon as possible.

Supervision:

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Application: please send us by email a curriculum vitae.

Context:

In the context of the AGILE 4.0 project (2019-2022), ISAE-SUPAERO and ONERA offer an internship related with numerical optimization and aerospace engineering. The AGILE 4.0 project is the AGILE (2015-2018) follow-up project that intended to develop the next generation of aircraft multidisciplinary design and optimization processes, which target significant reductions in aircraft development costs and time to market, leading to cheaper and greener aircraft solutions.
The internship is proposed in collaboration with ONERA (the French aerospace lab). The successful candidate will be welcomed in a multidisciplinary team. A net gratification will be around 550 Euros per month with possible housing facilities in the ISAE-SUPAERO campus.

Subject:

Super-Efficient Global Optimization (SEGO) is a well-established Bayesian solver to optimize expensive-to-evaluate and black box optimization constrained problems. SEGO has been successfully applied to a variety of industrial problems in particular those arising from aircraft design. SEGO focuses on problems with pure continuous design variables. However, in the field of aircraft design, optimization problems may involve different kinds of variables. For instance, continuous variables describe the size of aircraft

structural parts: in case of thin-sheet stiffened sizing, they represent panel thicknesses and stiffening cross-sectional areas. The set of discrete variables can encompass design variables such as the number of panels, the list of cross sectional areas or the material choices. The aim of this internship is to adapt SEGO to solve optimization problems with discrete and continuous (i.e., mixed) design variables.

The successful candidate will study existing works related to the use of Bayesian optimization to handle mixed variables. Then, the student will modify SEGO to handle mixed variables. The obtained solver will be validated, first, in a set of academic test problems. Last, we will test the obtained method on realistic test cases related to AGILE 4.0 project.

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