code-DISP-2026A

Call for applications for a M2 research internship

Generative AI and Transfer Learning for Automated MDAO Architecture Design in SysML environments

Supervision
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University: Lyon 2
Research laboratory: DISP laboratory, EA 4570

Required profile:
Final-year master student in Computer Science, Software Engineering, Industrial Engineering motivated by the challenge of developing Generative AI model

Funding: DISP Laboratory, 4.50€/hour, approximately 650€/month

Internship period: 5 to 6 months, expected start in February 2026

Required skills:
• Background in Systems Engineering, Computer Science, AI/ML, or related fields • Solid knowledge and technical proficiency in machine learning, including experience with deep learning methods and common frameworks (TensorFlow, PyTorch, Hugging Face) • Knowledge of MBSE principles and SysML modeling (or willingness to learn) • Interest in MDAO, multidisciplinary modeling, or engineering optimization • Good analytical, programming, and communication skills

Key words: MBSE, MDAO, SysML, MBSE-MDAO Integration, LLMs, Generative AI,Transfer Learning, DSML, XDSM, Systems Engineering

Topic description

Context

The increasing complexity of modern systems requires methodologies that can ensure consistency, traceability, and effective collaboration across multiple engineering disciplines. Model-Based Systems Engineering (MBSE) has become a central approach to managing this complexity by using formal models, particularly SysML, to represent system architecture, requirements, and design rationale. In parallel, Multidisciplinary Design Analysis and Optimization (MDAO) provide an integrated framework for performance evaluation and optimization across domains such as structure, aerodynamics, and energy management.

Integrating MBSE with MDAO offers new research direction for the design and analysis of complex systems. In MBSE practice, the reuse of paradigms for handling complex problems provides a viable pathway for addressing multi-disciplinary analytical challenges. Among various approaches, generative AI has been widely studied for the automatic design of complex systems; however, whether this paradigm can be applied to the MDAO domain still remains an open question.

In this context, the internship is part of a broader research effort aimed at leveraging machine learning, transfer learning, and related approaches to adapt existing MBSE-oriented LLMs or general-purpose LLMs for use in the MDAO domain. The objective is to provide an automated method for generating analysis architectures and to define a closed-loop learning workflow. This approach supports agile design methods for multidisciplinary analysis and optimization, while promoting knowledge transfer and reuse.

Mission Description

The mission focuses on adapting existing MBSE-oriented or general-purpose Large Language Models through transfer learning, enabling them to understand MDAO concepts, modeling patterns, and the constructs of our SysML-based MDAO DSML. Building on this adapted model, the intern will develop methods for the automatic generation of multidisciplinary analysis architectures, including the creation of prompts, fine-tuning datasets, and knowledge structures that allow the AI to produce SysML-compliant representations of MDAO problems and solution architectures (e.g., XDSM-style analysis chains and coupling structures). The objective is to ensure that the generated architectures are structurally correct, aligned with SysML semantics, and directly usable within model-based MDAO workflows.

Suggested work program

Estimated Duration	*Tasks*	*Objectives*	*Deliverables*
4 weeks	Requirements analysis, mock-up setup	Understand current GenAI for MBSE models, SysML language principles and MDAO demands	A set of feasible candidate models
4 weeks	Build generative AI model	Achieve 1st executable prototype to generate SysML model	GenAI model prototype Code documentation

2 weeks	Define adaptive learning loop	Clarify the learning loop, adapted to AI models	User guideline
4 weeks	Optimize AI prototype	Compare different solutions, adapted to learning workflow	Code documentation
2 weeks	Validate AI prototype	Finish demonstration/PoC	GenAI model User guideline
4 weeks	Documentation and research outcome	Prepare final report, demo, and publication material	Research publication
4 weeks	Prepare final report and dissertation	Use the institution guidelines to prepare the final manuscript	Final manuscript + PPT presentation

Expected Deliverables
• A partially or fully fine-tuned LLM capable of producing SysML-compliant MDAO architectures.
• A prototype toolchain demonstrating end-to-end generation of analysis workflows.
• Documentation and a final report summarizing methodology, experiments, and results.

Application
The application must include:
- Detailed and updated CV.
- M2 transcripts (available ones).
- M1 transcripts.
- M1 internship report or M1 research project report.
- Bachelor (L3 or equivalent) internship report or final-year project report.
- Motivation letter.
- Recommendation letter
- GitHub or project portfolio link

Application deadline: January 20, 2026 (inclusive).

Submit your application **before 21/01/2026** by filling out this form: https://forms.gle/JobxFyEgvWWeRGkH6