Research project offer

Location: ISAE SUPAERO, Toulouse, France

Department: Department of Complex Systems Engineering (DISC)

Research group: CASC (Critical Systems Design and Analysis)

Supervisor: Prof. Pierre de Saqui-Sannes

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OFFER DESCRIPTION

Title: Complexity of SysML Models

Proposed duration and period: May 2, 2022 to August 31, 2022

Context	The Systems Modeling Language (SysML) is an international standard at OMG (Object Management Group). The standard defines a notation, not the way of using it. The lack of guidelines for smart use of SysML has been reported as a break to MBSE development. Ignorance of good practices is further a cause of complexity in the SysML models developed by insufficiently trained systems engineers. So far, little work has been published on SysML model complexity analysis. Such a complexity deserves to be computed and analyzed. This is the objective of the internship with application on systems such as UAVs.

Possibility to continue with a PhD (Yes/No): Yes

REQUIRED APPLICANT PROFILE AND SKILLS

Study Level	X Undergraduate students (3rd or 4th year) X Master students (1st year) ☐ PhD students
Objectives and work	- Survey of research papers on model complexity analysis - Learning SysML and the free software TTool - Identifying metrics for SysML model complexity analysis - Prototyping a complexity analyzer for TTool - Case studies, e.g., drones. References [1] OMG Systems Modeling Language, Object Management Group, https://www.omg.org/spec/SysML/1.6, Dec. 2019. [2] J.-L. Raffy, "Complexity of Estelle specifications (in French)," Ph.D. dissertation, INT-Evry, France, 1998. [3] S. J. Huang and R. Lai, "On measuring the complexity of an Estelle specification," Journal of Systems and Software, vol. 40, no. 2, pp. 165–181,February 1998. [4] Siau, Keng, "Theoretical vs. practical complexity: The case of UML," JDM, vol. 16, no. 3, pp. 40–57, 2005. [5] B. Xu, D. Kang, and J. Lu, "A Structural Complexity Measure for UML Class," in ICCS 2004 - LNCS 3036. Springer-Verlag Berlin Heidelberg, 2004, pp. 421–424. [6] S. Mahmood and R. Lai, "Complexity measure for UML component-based system specification," Software Practice and Experiene, vol. 38, pp. 117–134, 2008. [7] L. Apvrille, P. de Saqui-Sannes, O. Hotescu, and A. Tempia Calviono,"SysML Models Verification Relying on Dependency Graphs. In: MODELSWARD 2022 : 10th International Conference on Model-Driven Engineering and Software Development, February 2022 (Virtual, Vienna, Austria).
Required profile and skills	Basic knowledge of UML or SysML would be an asset (not a mandatory prerequisite)
Other useful information	