Project proposal

Title: **MBSE approach to the SE life cycle for the EPFL Xplore Rover 2022**
Supervisor: Simon Hamel
Timeframe: Spring 2022

EPFL Xplore is an interdisciplinary project whose aim is to design and develop a Rover to participate in two international competitions: the University Rover Challenge and the European Rover Challenge. System engineering is used extensively through the whole product life cycle in order to have a working system at the end.

Project description

Problematic

System engineering has been used since the creation of EPFL Xplore. However, the approach taken was mostly traditional, with different documents (google doc, google sheet, lucidchart) of different types for different aspects (requirements, mass/power/energy budgets, equipment list, system architecture, etc). This induces lack of traceability and lack of clarity: only the corresponding system engineer understands well the aspect of the system he/she is responsible for. Due to sometimes unclear interface definition/requirement and lack of communication, time is wasted and integration becomes problematic.

The purpose of this semester project is to first study model-based system engineering, and to propose an implementation in the EPFL Xplore project.

Firstly, the student will do research on MBSE in order to understand how it is used in the industry.
Then, a solution of implementation in the EPFL Xplore project will be proposed. More precisely, the use of MBSE in the context of the project will be clarified for the requirement definition, functional analysis, architecture and design definition, assembly, integration and testing, and verification + validation (this list is not exhaustive and could be changed depending on what is relevant in the context of the project).

Finally a generic modelling of the EPFL Xplore 2022 Rover or a more precise modelling of a subsystem will be done through a relevant tool, mainly for illustration purpose. The model does not have to be complete, it will be mainly used to illustrate the proposed implementation of MBSE for the EPFL Xplore 2022 Rover project.

Required skills

MT/Robotics/EL master student
minor in Space technologies or system engineering is preferred
experience in system engineering preferred

Recommended reading

Architecting Spacecraft with SysML: A Model-based Systems Engineering Approach - Sanford Friedenthal, Christopher Oser

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