Internship – Modeling and Simulation of Aircraft Operations

Duration: 6 months
Location: ISAE-SUPAERO, Toulouse
Intended start date: April 2021

Context
The internship will take place at the department of Aerospace Vehicles Design and Control (DCAS) in ISAE-SUPAERO. It will be part of a joint research project with AIRBUS called HOP (Holistic Operability Projection) which deals with predicting the operational performance of future aircraft using simulation and data analytics.

In recent years, there are increasing expectations regarding aircraft operational performance (minimum downtime, low maintenance, etc.) which go beyond the safety requirements. It directly impacts the operating cost and aircraft availability thereby affecting the profitability of airlines. Therefore, it is important to predict the aircraft operational performance during early development stages of the aircraft in order to perform trade-off studies between different design alternatives.

Mission
Different events that impact aircraft operational performance like failures, maintenance activity, etc. have been already identified. This internship involves developing simulation models of these events using classical techniques like Discrete Event Simulation (DES), Agent Based Modeling (ABM), etc. combined with data-driven models (hybrid-modelling approach), and to perform a trade-off study between these techniques. Since these events are non-deterministic in nature, the developed simulation methods should take into account the uncertainty and probabilistic nature of aircraft operations. Through simulation results, it should be possible to evaluate the aircraft operational performance for different missions, operating conditions, etc. The developed simulation prototype will be validated on a practical use-case and the advantages and limitations of these methodologies will be ascertained. The intern will be supported with resources in getting familiarized with aircraft operability concepts.

Main tasks of the internship include:

- Understanding the basic elements involved in aircraft operability.
- Investigating Discrete Event Simulation (DES) and Agent Based Modeling (ABM) simulation techniques for the aircraft operations problematic, and their combination with data-driven modelling (hybrid model).
- Prototyping the simulation method using suitable language/ tools.
- Testing the methods on a pre-defined use-case.
- Comparing the simulation techniques and identifying their pros and cons.

Pre-requisites
- Master / Bac +5 student with a specialization in Applied Mathematics, Computer Science, Operations Research, Systems or Aerospace Engineering with a keen interest in simulation techniques
- Previous experience or knowledge in Modeling & Simulation methods / tools.
- Proficiency in Python, Matlab or other scripting languages is preferable.
- Basic knowledge of aeronautics/ aircraft operations is a plus.
- Good proficiency in English (working language).

Contact:
Please send your CV and Cover letter to:
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