PhD offer : Study and modeling of the SORA (Specific Operational Risk Assessment) mission

Record number : OPR-1132

Overview

RESEARCH DIRECTION

François Ferland, Vice-doyen - FGEN Administration

INFORMATION

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RESEARCH CO-DIRECTION

David Rancourt, Professeur - Department of Mechanical Engineering

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ADMINISTRATIVE UNIT(S)

Faculté de génie
Département de génie électrique et de génie informatique
Département de génie mécanique
Institut interdisciplinaire d'innovation technologique (3IT)

LEVEL(S)

3e cycle

LOCATION(S)

3IT - Institut interdisciplinaire d'innovation technologique
Campus de Sherbrooke

Project Description

Context:
Numerical simulations are commonly used in the aeronautics industry, for example to analyze the integrity of fuselages or even the risk of collision with birds near an airport. However, there is no integrated method for numerically analyzing the risk associated with drone operations beyond direct visibility (Beyond Visual Line-Of-Sight – BVLOS), a necessary step in the Specific Operational Risk Assessment (SORA) process for authorizing a mission. In this context, our research project, in partnership with CAE and Unither Bioelectronics, aims to develop a complete processing pipeline for the production of synthetic data from a sophisticated simulation environment of a flight corridor, including weather conditions, ground infrastructure, airspace traffic interactions and even the quality of communication links to operate the drone, all of this fed by both historical and live data. The system will allow three-dimensional visualization of various events that may occur, and an automated risk analysis will make it possible to issue recommendations to reduce the risks associated with certain operations.

Topic:
This thesis aims to explore the automation of mission risk analysis from the generation of synthetic data from a simulator. The successful candidate will be responsible for (i) understanding the SORA processes and risk categories for the development team. An internal report detailing the SORA analysis procedure can help to identify inputs and outputs, such as the information needed for the analysis and the format required for the risk analysis. (ii) designing the risk analysis simulation system. Proofs of concept for the application of some of these algorithms can be carried out, with particular attention paid to the anticipated time required for the implementation of these algorithms by our team in later stages of the project, aiming to mitigate the risk of deadline overruns given the relatively short duration of the project. (iii) modeling non-cooperative and cooperative traffic for one or more entities. At the end of this thesis, the student will have established an in-depth analysis of the SORA process leading to a system architecture for a data production and analysis pipeline for risk assessment; a complete software model of an unmanned aerial vehicle (UAV) and its interactions with other airborne entities.

Work Supervision:
This PhD thesis will be realized under the co-direction of Pr. François Ferland, Pr. David Rancourt and Pr. Adina Panchea, as part of Alliance Project between Université de Sherbrooke, CAE & Unither Bioélectronique on acceleration of the Specific Operational Risk Assessment (SORA) mission risk analysis process for the future of air mobility. The work will be carried out at the Interdisciplinary Institute for Technological Innovation (3IT) of the University of Sherbrooke and in collaboration with industry-leading professionals from our world-class partners CAE and Unither Bioelectronics. The student will thus benefit from an exceptional research environment bringing together students, professionals, professors and industrialists working hand in hand to develop the technologies of the future.

Desired Profile
• Master's degree in electrical or mechanical engineering
• Experience aeronautics with digital twins or robotics simulation environments
• Programming skills (primarily Python and JavaScript). Skills in web application development are a strong asset
• Ability to communicate in English or French both orally and in writing
• Strong ability to adapt, be autonomous and work in a team
• Pronounced taste for design, research and development

Contact : recrutementAIRGIFT@usherbrooke.ca

Starting date: September 2025
Documents to provide: Cover letter, curriculum vitae and transcripts for the past two years

Discipline(s) by sector

Sciences naturelles et génie

Génie électrique et génie électronique,
Génie mécanique

Funding offered

Yes

Partner(s)

CAE , Unither Bioélectronique

The last update was on 24 July 2026. The University reserves the right to modify its projects without notice.