

# PhD offer : Development of software implementing environmental simulation in SORA (Specific Operational Risk Assessment) process for the future of air mobility

Record number : OPR-1126

## Overview

### RESEARCH DIRECTION

François Ferland, Vice-doyen - FGEN  
Administration

### INFORMATION

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### RESEARCH CO-DIRECTION

David Rancourt, Professeur - Department  
of Mechanical Engineering

### INFORMATION

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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

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## 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 achieve a realistic and sufficiently comprehensive simulation of the corridor terrain, its meteorological conditions, and especially the potential air traffic present there. The successful candidate will be responsible for (i) creating a dynamic model of controlled entities incorporating three types of turbulence impact (no impact, moderate, and significant). (ii) modeling non-cooperative and cooperative traffic for one or more entities that implement three basic behaviors: hostile, near miss, and random (iii) generating three-dimensional models of the terrain and infrastructures (buildings, roads, power lines, etc.) for specific corridors, as well as a model of meteorological conditions that impact the flight dynamics of the aircraft under study. For replicating corridor terrain, we will explore the conversion of publicly available data from sources like OpenStreetMap (OSM) to integrate them into our simulation's terrain database, allowing offline queries without directly communicating with OSM servers during scenario execution. At the end of this thesis, the student

will have developed a complete software model implementing the fundamental simulation environment and a processing pipeline in the form of a set of software tools allowing efficient automation of the production and consolidation of synthetic data.

**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 in 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](mailto: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**

**Funding offered**

**Partner(s)**

Yes

CAE , Unither Bioélectronique

**Sciences naturelles et génie**

Annual \$ 30 000

Génie électrique et génie électronique,  
Génie mécanique

The last update was on 24 October 2025. The University reserves the right to modify its projects without notice.