Rodolphe Fremond

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Proposing expertise in research, engineering, project management, and data science:

Air Traffic Management (ATM), Unmanned Aircraft System Traffic Management (UTM), Airspace Safety, Avionics, Simulation, and applied Artificial Intelligence/Machine Learning (AI/ML).
Unrestricted to live and work in the UK and EU. Limitless location.
Available from April 2026.

Experience

AI/ML & ATM/UTM Post-doctoral Researcher, *École Nationale de l'Aviation Civile, Airbus Sopra Steria Drones and UTM Research Chair, Toulouse, Occitanie, France.* — from Nov. 2024 to present

- **Airspace design**: Investigated the use of Reinforcement Learning (RL) for generating cyclic corridors and optimising its structure to cope with environmental UTM-related constraints. Awarded research at DASC. On-going research track aims at using RL to parametrize bio-inspired algorithms to refine more complex airspace corridor structure, target SciTech 2026.
- **Simulation environment**: Designed *STRATUS* (Simulation Tool for Research on Airspace Traffic and UTM Services), a large-scale academic UTM testbed integrating ORCA and PGFlow collision avoidance algorithms in addition to the elaboration of safety metrics. It has been proof-tested and presented at Airspace World 2025.
- **Mixed-reality testbed**: Co-developed a mixed-reality environment combining simulated traffic with live drone operations to assess safety-sensitive operations to further assess the above airspace design and integrated separation assurance functions. First results will be submitted to SESAR Innovation Days 2025.

Ph.D. Candidate in Aerospace & Research Assistant, *Faculty of Engineering and Applied Sciences, Cranfield University, Bedford, Bedfordshire, United-Kingdom.* — from Sep. 2021 to Sep. 2024

- Developed a set of **Multi-Agent Reinforcement Learning (MARL)** solvers for UTM-adapted safety nets Tactical Conflict Resolution, embedded as an end-to-end U3 service within U-space architectures.
  Integrated with a set of advanced U-space services (Operation Plan Preparation and Optimisation, Risk Analysis Assistance, Dynamic Capacity Management, Strategic Conflict Resolution, Conformance Monitoring, Contingency Management).
  Validated across diverse airspace configurations and in **mixed-reality trials** with manned and unmanned traffic under perturbations, degraded communication, and non-cooperative behaviours.
  Benchmarked solver performance against existing UTM systems, **adapting safety standards and recommendations** as evaluation metrics.
  This research contributed directly to the **SESAR AMU-LED project** (UK's first advanced U3 deployment; twice awarded) and the **AMEC project** (UKRI Future Flight Challenge).
- Supported the design of an academic **Digital Twin** integrating UTM in-flight services, applied in Future Flight Challenge projects (**HADO**, **AMEC**). Enhanced with **co-simulation frameworks** (BlueSky, AirSim) enabling large-scale validation of the above UTM systems.
- Contributed to the launch of the world's first **MSc in Advanced Air Mobility Systems**, embedding a UTM research track and attracting significant funding.
- Published 10+ peer-reviewed papers in top-tier (Q1) journals (**IEEE TAES**, **IEEE MAES**, **TRC**) and international conferences (**SESAR Innovation Days**, **DASC**, **ICRAT**).

Education

Ph.D. in Aerospace, *Cranfield University, Bedford, Bedfordshire, United-Kingdom.* — 2024
Thesis [RESTRICTED ACCESS]: Adaptive Multi-Agent Reinforcement Learning Solver for Tactical Conflict Resolution as a Collaborative Unmanned Aircraft System Traffic Management Service.

M.Sc., *Cranfield University, Bedford, Bedfordshire, United-Kingdom.* — 2021
Focus: Aerospace Vehicle Design – Avionics Systems.

Diplôme d'Ingénieur (i.e., **MSc/MEng**), *École Speciale des Travaux Publics, Paris, France.* — 2021
Focus: Civil Engineering – Electrical, Mechanical, and Energy Efficiency.