Master Thesis - “LLM agents for jet engine performance modelling” (30 credits/20 weeks – 1 student)

About us

GKN Aerospace is the world’s leading multi-technology tier 1 aerospace supplier. With 33 manufacturing locations in 12 countries, we serve over 90% of the world’s aircraft and engine manufacturers. We design and manufacture innovative smart aerospace systems and components. Our technologies are used in aircraft ranging from the most used civil aircraft to the world’s advanced 5th generation fighter aircraft and the Ariane orbital rockets used by ESA.

Project Background

In early concept work we follow market and technology trends, translate future aircraft requirements into engine requirements, and build engine performance models to size new engine concepts and compare them with competitors and previous designs.

Engine performance modelling is a knowledge-intensive process. Starting from the thrust and specific fuel consumption required by the aircraft, engineers run cycle studies in performance modelling softwares to produce component corner points and functional data such as mass flow, temperatures, pressures handed over to component design. Large Language Model (LLM) agents can now plan, write code and use tools, but we do not know how well they cope with a specialised process like this: a proprietary modelling language, in-house conventions, and knowledge spread across documents and earlier models.

Assignment Description

The aim is to develop and evaluate an LLM agent that follows GKN’s ways of working to support, and when requested carry out, the engine performance modelling process, and to evaluate how the design of the agent affects its performance. The preliminary project plan is:

1. Problem Understanding: Learn the engine performance process from the literature, the engine performance modelling software language and GKN’s working instructions.
2. Benchmark and Evaluation Design: Define test cases, from aircraft requirements to component corner points, based on generic inputs such as public engine design studies, and the metrics to judge the agent: correctness of results, adherence to procedures, robustness, cost and time.
3. Agent Development: Build prototype agents with different architectures and different ways of accessing knowledge.
4. Experiments and Evaluation: Compare the architectures, vary instructions and knowledge sources, and assess the results against the benchmark.

Qualifications

Required:

- MSc students enrolled in Aerospace, Mechanical Engineering, Engineering Physics or a related program.
- Coursework in gas turbines, propulsion or thermodynamics.
- Proficiency in Python programming.

Highly Deisrable:

- Experience building applications with LLM APIs or agent frameworks (e.g. Pydantic AI, LangGraph, MCP).
- Experience with coding agents (claude code, codex, etc).

Apply by

Send your resume and cover letter to Alex Pradas, Emma Albinsson. Last date for application: 2026-11-15.

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