


Did You Know?

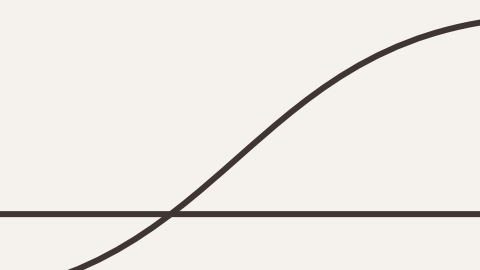
A single transatlantic flight produces more CO₂ than the average person generates in an entire year of driving





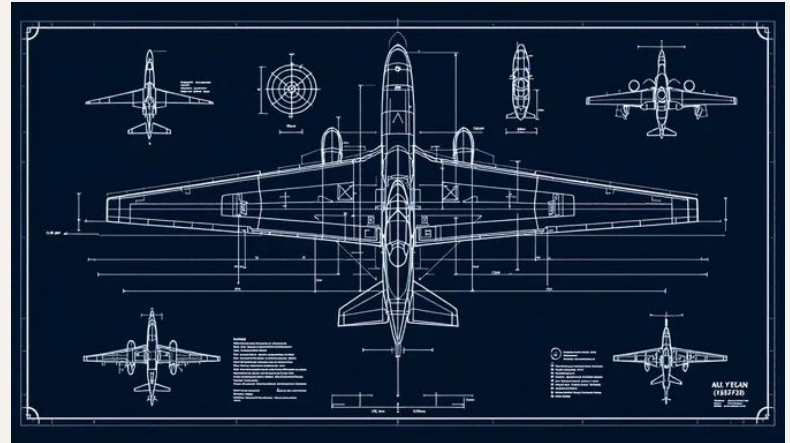
How Large Language Models Are Transforming The Aerospace Industry

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Period 6



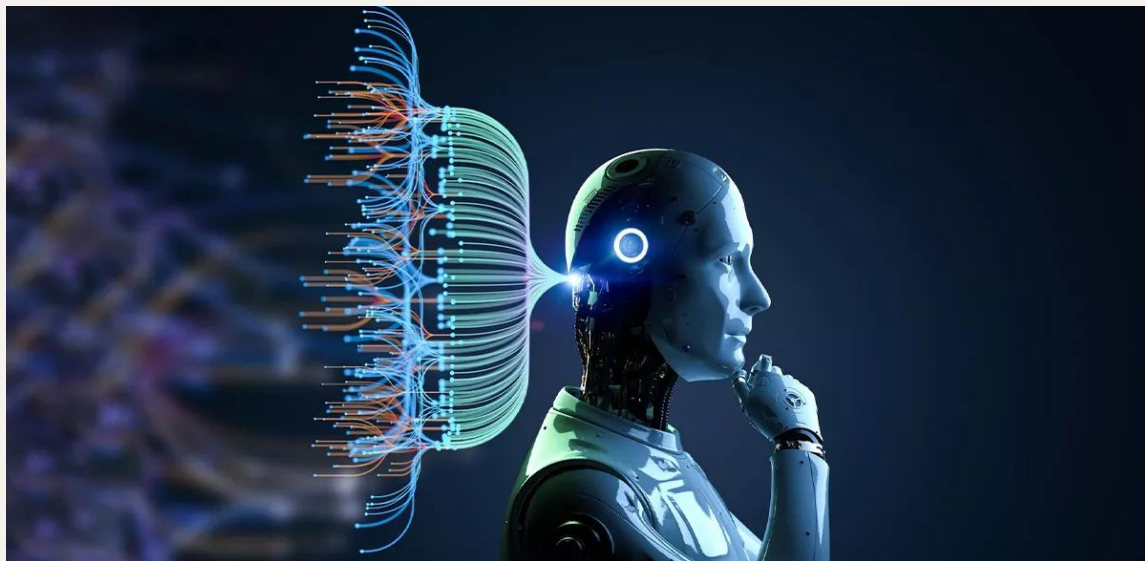
Research Question + Hypothesis

- In what ways can industrial AI systems and large language models help engineers design reliable, effective, and sustainable aviation technologies?
- Problem: Aircraft design = too many variables, slow testing, late fixes
- Hypothesis: Industrial AI + LLM support → faster analysis, earlier errors found, better efficiency choices



What Is a Large Language Model

- Trained on billions of documents
- Understands and generates language
- Reasons through new problems - doesn't just search



The Problem

- ~950 million tons - CO₂ from aviation in 2024
- 2.5% - aviation's share of global energy related emissions
- Years - how long traditional aircraft design can take



How LLMs Help Engineers Design Aircraft

- Faster Simulation - LLMs help process and interpret thousands of design variables in hours, not months
- Early Error Detection - AI identifies structural and efficiency flaws before a single prototype is built
- Smarter Optimization - LLMs suggest fuel efficient shapes and materials by reasoning across massive engineering datasets



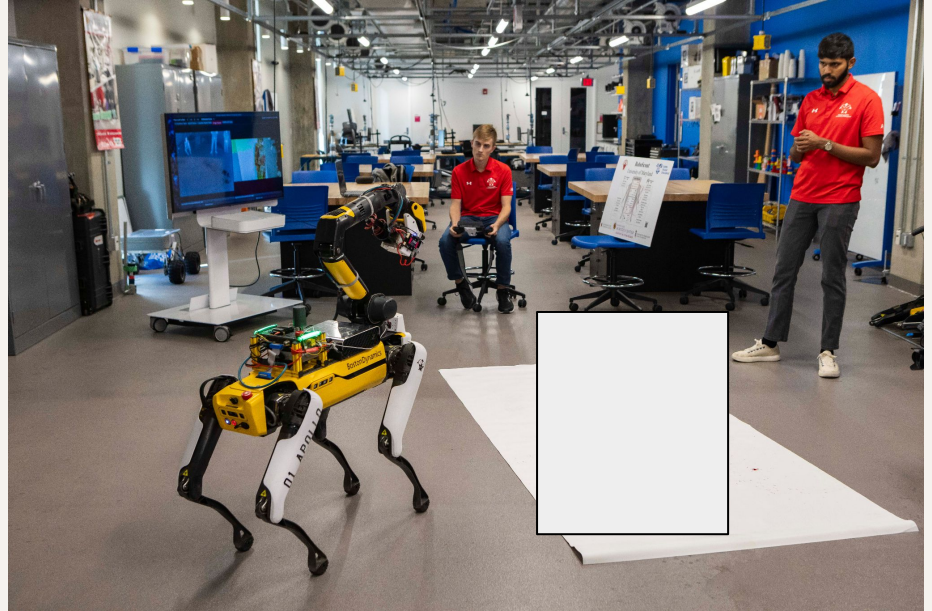
Current Advancements

- Boeing - uses AI for predictive maintenance and fuel efficiency modeling
- Rolls Royce - developed IntelliEngine, an AI system that monitors engines in real time and predicts failures before they happen
- Airbus - uses AI to optimize aerodynamic design and reduce material waste in manufacturing



Internship: UMD Industrial AI Center

- Assisted with ongoing research papers
- Observed LLM integration in manufacturing workflows
- Supported lab operations
- Learned how industrial AI is deployed in real environments



What I Learned

- About AI: It's a collaborator, not a replacement. The best engineering is always human + machine together.
 - About Research: Your first answer is never your deepest answer. Real understanding takes going further than the surface.
 - About the Field: Aviation is at an inflection point. The engineers designing aircraft today are the last generation to do it without AI.
 - About Myself: I can hold up in a university research environment. That surprised me, since I was scared to even start in the beginning.
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Sources

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