
Master Internship

Title: Design and implementation of innovative electrical distribution networks in more electric aircrafts based on mathematical programming

The internship which might be followed by a doctoral thesis will be supervised by:

- The academic team from LAPLACE laboratory
- The electrical system team from Thales Electrical Systems
- The algorithmic team from Thales Research & Technology

Company:

Thales is a world leader for space, aerospace, transportation, defense and security.

The avionics division of Thales (AVS) consists of 10,000 employees which work at designing and integrating new solutions for commercial and military aeronautical equipment.

AVS supplies flight avionics, electrical power generation and conversion, and in-flight entertainment and connectivity systems. It encompasses training and simulation solutions for air, land and joint forces as well as microwave and imaging subsystems.

Locations in Ile de France:

- The electrical system team is located in Chatou (250 employees).
- The algorithmic team is located at Thales Research & Technology in Palaiseau.
- The LAPLACE laboratory is located in Toulouse (distance supervision).

Mission:

Should you decide to accept it, we offer a 6 months internship at Thales Research & Technology in the heart of the scientific cluster of Paris-Saclay.

As aircraft become more electric and more systems are electrified, onboard architectures and power management become increasingly complex and critical. The optimization of the mass of electrical equipment onboard becomes more and more difficult as well as the smart and safe reconfiguration of the electrical system in case of single or multiple failures.

According to literature, mathematical programming was first introduced to handle energy management issues in case of terrestrial networks and smart grid.

The introduction of new technologies such as mathematical programming in aircrafts systems can help:

- Optimizing the design and functioning of electrical systems of future more electrical aircrafts with new energy sources onboard and energy storage
- Improving existing ones.

The objectives of the master is the following:

- On the basis of an existing regional aircraft electrical system, deploy the mathematical programming allowing the reconfiguration of the aircraft electrical system for the different cases of single and multiple failures of the different electrical system equipment.
- Find a method to validate/verify the results of the reconfiguration of the electrical system obtained with the mathematical programming.
- For certification reasons, the formal proof aspect will have to be brought by the method as well as the relevance of the method to treat all the combinatorics of multiple failures.

This internship is aimed at students with theoretical and practical knowledge of mathematical programming using solvers such as Gurobi or CPLEX (IBM), as well as a good knowledge of Python programming. Minimal knowledge in the field of electrical engineering is a real plus.

This internship could lead to a thesis.

Requested profile:

Engineer or Master in applied mathematics / electronics

Required Skills and Experience:

- Smart grids, microgrids
- Operational Research (Mathematical Programming, Constraint Programming)
- Python, SciPy
- English: written, read and spoken.