RAPHAËL GAUTIER

Seeking a Full-Time Position
Development and Implementation of Machine Learning Methods

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OBJECTIVE

- Currently seeking a full-time engineering research position
- Eager to apply my skills in a team setting to tackle challenging engineering problems while making contributions to exciting research areas
- My research interests lie in actively learning, developing, and implementing computational methods to solve real-life engineering problems

EDUCATION

Doctor of Philosophy | Aerospace Engineering | GPA: 4/4
Georgia Institute of Technology | Atlanta, GA
2016 – 2022

- Focused on the creation of surrogate models for expensive analyses with high-dimensional inputs when only few observations are affordable
- Developed a fully Bayesian method for supervised dimension reduction
- Extended it to the multi-fidelity context using deep multi-fidelity Gaussian processes
- Investigated sampling strategies leveraging a low-dimensional feature space

Master of Science | Aerospace Engineering | GPA: 4/4
Georgia Institute of Technology | Atlanta, GA
2014 – 2016

Courses in advanced design methods, optimization, controls, mathematics, management, fluid dynamics, and aerodynamics

Engineering Degree | Computer Science & Engineering | GPA: 4/4
Supélec | Rennes, France
2012 – 2014

French top-tier engineering school in computer science, electronics, and controls

Preparatory School | Mathematics, Physics & Chemistry
Lycée Privé Sainte-Geneviève | Versailles, France
2010 – 2012

Two-year intensive program preparing to nationwide competitive entrance exams

AREAS OF INTEREST

- Supervised Learning
- Dimension Reduction
- Bayesian Methods
- Gaussian Processes
- Uncertainty Quantification
- Engineering Optimization
- Adaptive Sampling

PROGRAMMING

Proficient in Python. Some experience with R, C, Java, MATLAB, Bash, VBA, SQL, Javascript.

SOFTWARE TOOLS

Machine Learning JAX, scikit, (num)pyro, HPC on a cluster. Some experience with Stan, Tensorflow, Pytorch

Visualization Jupyter, ipywidgets, matplotlib, seaborn, plotly/Dash

Software Dev. git, CI/CD, VMs, docker, GNU/Linux, VSCode

Authoring MS Office, LaTeX, diagrams.io, Sphinx, MkDocs

Multimedia Premiere, Inkscape

LANGUAGES

English, French — full proficiency
German, Spanish, Italian — notions

EMPLOYMENT

Research Intern
GE Research | Niskayuna, NY
August to December 2019

- Directly contributed to the development of physics-based probabilistic models that estimate the failure rate of mechanical parts; my proposed approach and Cython implementation reduced the training time from minutes to seconds
- Assessed the potential of preconditioned conjugate gradient methods (PCGM) to speed up the training of Gaussian process models; my results were used to inform the development of an in-house predictive modeling tool
- Developed a fully Bayesian approach to supervised dimension reduction using ridge approximation and implemented a proof of concept; resulted in my PhD topic and a publication at the International Journal for Uncertainty Quantification

Skills: `PROBABILISTIC MODELING` `BAYESIAN INFERENCE` `DIMENSION REDUCTION` `GAUSSIAN PROCESS MODELING` `PYTHON` `CYTHON`

Graduate Research Assistant
Aerospace Systems Design Lab | Atlanta, GA
August 2014 to December 2021

- MBSE-enabled Overall Aircraft Design | sponsored by Airbus Commercial Aircraft | 2017-2021
  - Proposed and compared alternative approaches for calibrating a low-fidelity multidisciplinary analysis and optimization (MDAO) process for designing a flexible aircraft wing using limited standalone evaluations of a high-fidelity disciplinary analysis
  - Developed a methodology and software prototypes to demonstrate how MDAO processes can be designed, configured, and automatically executed based on specifications created using model-based systems engineering (MBSE) tools
  - Researched, implemented, and compared different approaches to create surrogate models with both high-dimensional inputs and outputs in the context of an aircraft's wing aerostructural analysis
  - Regularly delivered work products and presented my contributions to various groups within Airbus; my results were then leveraged internally at Airbus to inform the transformation of their overall aircraft design processes

- UAV Design and Prototyping **|** sponsored by the US Special Operations Command **|** 2016-2017
  - Developed a Python modeling and analysis toolset for small unmanned aerial vehicles (UAVs) and used it to design a novel coaxial-rotor fixed-wing VTOL UAV; resulted in a prototyped version of the vehicle and an AIAA conference paper
- Smart Campus **|** sponsored by Georgia Tech **|** 2015-2016
  - Developed an Android app to enable the visualization of the Georgia Tech's sustainability metrics and play interactive what-if scenarios to understand the impact of future changes; the app was delivered to and used by Georgia Tech's leadership
- Micro-Autonomous Systems Research **|** sponsored by the US Army Research Lab **|** 2014-2015
  - Developed and implemented a process to automate the design and rapid prototyping of multirotor UAVs, from end-user requirements (range, endurance) to sized components (motors, propellers...) and CAD geometry; resulted in two AIAA and AHS conference papers

Skills: `MODELING` `SYSTEMS ENGINEERING` `OPTIMIZATION` `UNCERTAINTY QUANTIFICATION` `SURROGATE MODELING` `OPENMDAO` `DESIGN` `PYTHON` `JUPYTER` `VOILA` `ONTOLOGY` `DATA VISUALIZATION` `GUI PROTOTYPING` `RAPID PROTOTYPING`

Software Developer Intern
Marte Conseil | Neuilly-sur-Seine, France

July to August 2014

- Interned at a small software engineering consulting firm focused on the development of a novel ontology-based framework for building applications based on versioned structured data
- Conducted a literature review of state-of-the-art versioning information systems to document an official request for a six-figure research tax credit that was eventually granted
- Participated in the design and development of new features of the framework

Skills: `JAVA` `GRANT WRITING`

Production Operator Intern
evian | Amphion-les-Bains, France

August 2013

- Interned for a month as a production-floor worker at the evian bottling plant; held different positions within the team in charge of bottling glass bottles and small-volume items

PUBLICATIONS

- R. Gautier, P. Pandita, S. Ghosh, and D. Mavris, "A fully Bayesian gradient-free supervised dimension reduction method using Gaussian processes," *International Journal for Uncertainty Quantification*, 2022

- D. Rajaram, R. H. Gautier, C. Perron, O. J. Pinon-Fischer, and D. Mavris, "Non-intrusive parametric reduced order models with high-dimensional inputs via gradient-free active subspace," in *AIAA AVIATION 2020 FORUM*, 2020, p. 3184

- Z. C. Fisher, R. H. Gautier, C. A. Wilson, M. J. Steffens, and D. N. Mavris, "Design and manufacturing of a coaxial-rotor fixed-wing VTOL UAV," in *2018 AIAA Aerospace Sciences Meeting*, 2018, p. 1010

- R. H. Gautier, Z. C. Fisher, C. B. McMillan, M. J. Steffens, and D. N. Mavris, "A configuration-independent modeling toolset for the analysis of small-scale electric-powered UAVs," in *2018 AIAA Modeling and Simulation Technologies Conference*, 2018, p. 1918

- A. Cheng, Z. Fisher, R. Gautier, K. Cooksey, N. Beals, and D. Mavris, "A model-based approach to the automated design of micro-autonomous multirotor vehicle systems," in *American Helicopter Society 72nd Annual Forum and Technology Display*, 2016