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Assistant professor in Electrical Engineering & Control

Research Experience

- | | |
|---------------------------|---|
| <i>2014–
present</i> | Assistant professor of Electrical Engineering & Control at <i>CentraleSupélec</i> , Rennes campus, in the Automatic Control group of <i>IETR</i> .

Core research topics: analysis, sizing and optimal control of energy systems under uncertainty (e.g. solar and wind power production). |
| <i>2011–2014</i> | PhD research at the SATIE CNRS laboratory, <i>ENS Rennes</i> , France

“Sizing and optimal control of an energy storage associated with wind power generation” |
| <i>2011,
4 months</i> | Master thesis at L2S, <i>Supélec</i> , Gif-sur-Yvette, France

“Characterizing the uncertainty of wind power generation” |
| <i>2009,
7 months</i> | Research internship at ISN, <i>MIT</i> , Cambridge, USA

“Real-time simulation of power electronics circuits” |

Teaching

Teaching topics

- **Electrical engineering**: Power systems, Power electronics, Renewables
- **Control theory & System modeling**: Simulink, Modelica, Optimization

Teaching experience

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|--------------------------|---|
| <i>2014–
present</i> | Assistant professor of Electrical Engineering & Control at <i>CentraleSupélec</i> , Rennes campus.
200–250 hours/year.

2016–present: 1 st year electrical energy course (AC power, magnetic circuits, transforms, DC machines).

2016–present: creating and teaching a course on the <i>Modelica</i> multiphysics modeling language (33 hours).

2019–present: 2 nd year “engineering challenge term” on Microgrids and Renewable Energies, which includes an optimization project (with Nabil Sadou).

2020–present: Introduction to Power Systems course (15 hours).

2021–present: Optimization under Uncertainty course (9 hours). |
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Curriculum in Electrical Engineering & Control

- 2011–2014 | **PhD** on Energy Storage Sizing and Management for Wind Power, with the electric utility EDF, R&D department, and the SATIE CNRS laboratory at ENS Rennes, Rennes, France.
- 2007–2011 | Electrical Engineering & Control dpt. of ENS Paris-Saclay, Paris, France.
2011: **Master degree** in Control & Signal Processing at CentraleSupélec.
2010: **Agrégation** in Applied Physics.
Ranked first in this highly competitive test which is required by the French Education Ministry for teaching high school and undergraduate students.

Communication & Computing Skills

Scientific computing & data analysis

I'm interested in open source tools for reproducible scientific computing. GitHub: [pierre-haessig](#)

- **Scientific computing:** almost daily practice since 2011, often with [Jupyter](#) notebooks. Mostly Python, with more and more Julia; a bit of Matlab/Octave.
- **Statistics & Dataviz:** data analysis (e.g. time series) with Python (pandas, statsmodels) and extensive use of Matplotlib; small experience with R.
- **Optimization:** stochastic dynamic programming (created [stodynprog](#)), convex optimization tools ([JuMP](#)).

Graphics & Publishing

- **Vector graphics, diagrams & image editing:** Inkscape, draw.io, GIMP.
- **Document authoring:** LaTeX, Office suites (Microsoft's and LibreOffice), Markdown (slides with [Marp](#)), [Sphinx](#) (e.g. for online course assignments).
- **CMS/LMS:** Wordpress, Moodle (e.g. quizzes authoring).
- **Web design:** HTML, CSS, SVG, with Javascript animations ([Phaser](#)).

Languages

- **English:** fluent. 9 months of scientific internship in the USA. TOEFL: 110/120, TOEIC: 990/990 in 2008.
- **German:** basic skills. Years of study, several visits and weeks of immersion in Germany, but lack of recent practice.

Research Projects & Publications

Remark: only selected publications are listed in this "short" CV. See the "long" version for a complete list.

Fresh projects

- Optimal microgrid sizing considering uncertainty, PhD of Elsy El Sayegh (2021–2024)
- Optimal microgrid sizing with hydrogen-based seasonal storage, PhD of Jean Nikiema (2023–2026), with a grant from the Regional Council of Brittany.

Energy storage and renewable energies (2011–present)

Work on the optimal sizing and management of an energy systems including storage (batteries) and renewable power generation (wind, solar).

- E. de Godoy Antunes, **P. Haessig**, C. Wang, and R. Chouhy Leborgne, “Optimal Microgrid Sizing using Gradient-based Algorithms with Automatic Differentiation,” in *ISGT Europe 2022, Novi Sad, Serbia, 2022*. [[bib](#) | [DOI](#) | [http](#)]
- E. El Sayegh, N. Sadou, **P. Haessig**, S. Nasr, J. Bruschi, B. Jacquet, A. El Akoum, and H. Guéguen, “Towards avoiding microgrid design failures arising from an unrealistic operating strategy: an anticipative White Box model versus a responsive Black Box model,” in *Jeunes Chercheurs en Génie Électrique (JCGE22), Le Croisic, 2022*. [[bib](#) | [http](#)]
- **P. Haessig**, J. J. Prince Agbodjan, R. Bourdais, and H. Guéguen, “Solar home 2020: expanding the open source energy management under uncertain inputs benchmark,” in *SGE 2021, Nantes, France, July 2021*. in French. [[bib](#) | [http](#)]
- **P. Haessig**, “Convex Storage Loss Modeling for Optimal Energy Management,” in *IEEE PowerTech 2021 Conference, Madrid, Spain, June 2021*. [[bib](#) | [DOI](#) | [http](#)]
- I. Kordonis, A. C. Charalampidis, and **P. Haessig**, “Optimal operation of a grid-connected battery energy storage system over its lifetime,” *Optimal Control Applications and Methods*, 2021. [[bib](#) | [DOI](#) | [http](#)]
- **P. Haessig**, B. Multon, and H. Ben Ahmed, “Energy Storage Control with Aging Limitation,” in *IEEE PowerTech 2015 Conference, Eindhoven, the Netherlands, June 2015*. [[bib](#) | [DOI](#) | [http](#)]
- **P. Haessig**, *Dimensionnement & gestion d'un stockage d'énergie pour l'atténuation des incertitudes de production éolienne*. PhD thesis, ENS Cachan, July 2014. [[bib](#) | [http](#)]
- **P. Haessig**, B. Multon, H. Ben Ahmed, S. Lascaud, and P. Bondon, “Energy storage sizing for wind power: impact of the autocorrelation of day-ahead forecast errors,” *Wind Energy*, vol. 18, pp. 43–57, Jan. 2015. published online Oct 2013. [[bib](#) | [DOI](#) | [http](#)]

Resilient energy management (2017–2021)

PhD thesis of Jesse James Arthur Prince Agbodjan on how to take into account rare and extreme events (like grid outages) in Model Predictive Control.

- J.-J. Prince Agbodjan, **P. Haessig**, R. Bourdais, and H. Guéguen, “Integrating stochastic discrete constraints in MPC. application to home energy management system,” *IFAC Journal of Systems and Control*, p. 100168, jul 2021. [[bib](#) | [DOI](#) | [http](#)]

Modeling multi-energy systems in Modelica for control (2020–2022)

PhD thesis of Joy El Feghali ([defended](#) in 2023) which covers Modelica model simplification (with energy-based indices) and optimization based control using Modelica models.

- J. El Feghali, G. Sandou, H. Guéguen, **P. Haessig**, and D. Faille, “Energy-based method to simplify complex multi-energy modelica models,” in *Proceedings of 14th Modelica Conference 2021, Linköping, Sweden, September 20-24, 2021*, Linköping University Electronic Press, sep 2021. [[bib](#) | [DOI](#) | [http](#)]

Real-time simulation of Power Electronics (2009–2011)

Research I did before PhD. This project has since become a company, [Typhoon HIL, Inc.](#), which produces Hardware-in-the-Loop emulators of power electronics converters.

- M. Kinsy, D. Majstorovic, **P. Haessig**, J. Poon, N. Celanovic, I. Celanovic, and S. Devadas, “High-speed real-time digital emulation for hardware-in-the-loop testing of power electronics: A new paradigm in the field of electronic design automation (EDA) for power electronics systems,” in *PCIM 2011, Nuremberg, Germany, May 2011*. [[bib](#) | [http](#)]