# Gwen MAUDET, Post Doctoral Researcher

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## Introduction

I am currently a postdoctoral researcher at the University of Luxembourg, where my work focuses on integrating machine learning (ML) techniques to enhance the efficiency of solvers for Mixed Integer Linear Programming (MILP) problems. I previously completed my PhD at IMT Atlantique in Rennes, France, where my research centered on data transmission strategies for large-scale, highly constrained sensor networks.

**For a quick and structured overview of my profile, please visit my professional website**.

## Professional Experience

December 2023 – Present

- At *University of Luxembourg, Esch-sur-Alzette, Luxembourg. Postdoctoral Researcher* in **ML for MILP**. This position is jointly funded by the ANR (France) and the FNR (Luxembourg) under the collaborative project Ultra Big Optimization.
  My research focuses on hybrid methods for solving MILP problems, exploring novel approaches for redefining solver components through ML techniques. In particular, I investigate population-based algorithmic strategies and the generalization of these methods across a broad spectrum of MILP instances. In parallel, I have delivered several lectures at the master's level and supervised multiple students on course projects and in their roles as student assistants. I currently co-supervise a PhD student whose research is also part of the Ultra Big Optimization project.

April - September 2020

- At *INRIA, Rennes, France. Intern* in **Detecting Bias in Search Engines**.
  Contributed to the development of tools for detecting biases between search engines, including their integration into the web platform SNIDE and their evaluation through extensive experimental studies presented in a journal publication.

June - August 2019

- At *Acklio, Rennes, France. Intern* in **Header Compression for IoT Networks Using Clustering**.
  Developed a clustering-based method to identify similarities among IoT transmission headers, enabling the automatic generation of compression rules based on the mechanism defined in RFC 8724.

## Education

2020 - 2023

- At *IMT Atlantique, Rennes, France*. *PhD* in **Exploiting Sensor Similarity to Enhance Data Collection in Massive IoT Networks**. This doctoral work was funded by the VaLaDOE research chair.
  This thesis focuses on the monitoring of physical phenomena in environments equipped with large numbers of highly constrained sensors, both in terms of energy and communication capabilities. In particular, I investigated load-balancing mechanisms and similarity-based sensor grouping strategies under highly dynamic conditions.
  Defense Date: November 23, 2023; video.

2016 - 2020

- At *IMT Atlantique, Nantes, France*. *General engineering student* in **computer science for decision support**.
  Completed courses in Machine Learning, Operational Research, and graph theory. Participated in a one-semester academic exchange at Universiti Teknologi Petronas (Malaysia).

2014 - 2016

- At *Rabelais, Saint-Brieuc, France*. *Student* in **Classes préparatoires aux grandes écoles**.
  Completed a two-year intensive program in mathematics and physics (MPSI-MP) to prepare for the national competitive exam for entry into highly ranked engineering schools.

## Research Writings

### PhD Thesis

- **G.Maudet**, Exploiting Sensor Similarity to Enhance Data Collection in Massive IoT Networks, Link.

### International Journals

- P. Maillé, **G. Maudet**, M. Simon, and B. Tuffin, “Are Search Engines Biased? Detecting and Reducing Bias using Meta Search Engines,” en, *Electronic Commerce Research and Applications*, p. 101 132, Feb. 2022, issn: 1567-4223. (SJR: Q1) Link.

### International Conferences

- A. Vorokhta, **G. Maudet**, G. Danoy, "Selecting the Best Lower-Bound Strategy in a Branch-and-Bound Algorithm Using Genetic Programming", *International Workshop on Big Optimization*, 2026, Link.

- **G. Maudet**, G.Danoy, “A Distance Metric for Mixed Integer Programming Instances,” in *European Conference on Artificial Intelligence*, 2025, (CORE: A) Link.

- **G. Maudet**, G. Danoy, "Search Strategy Generation for Branch and Bound Using Genetic Programming," in *Proceedings of the AAAI Conference on Artificial Intelligence 39,* 2025, (CORE: A*) Link.

- **G. Maudet**, M. Batton-Hubert, P. Maille, and L. Toutain, “Energy Efficient Message Scheduling with Redundancy Control for Massive IoT Monitoring,” in *IEEE Wireless Communications and Networking*, 2023, (CORE: B) Link.

- **G. Maudet**, M. Batton-Hubert, P. Maille, and L. Toutain, “Emission Scheduling Strategies for Massive-IoT: Implementation and Performance Optimization,” in *IEEE/IFIP Network Operations and Management Symposium*, Apr. 2022, (CORE: B) Link.

## Research Writings (continued)

### National Conferences and Extended Abstracts

- M. Da Cunha, **G. Maudet**, G. Danoy, "Cutting Plane Selection for Mixed-Integer Linear Programming Using Genetic Programming," Extended Abstract, in *Conference on Optimisation and Learning*, April 2026.

- B. Blé, **G. Maudet**, G. Danoy, "Distance-based Portfolio Learning for Mixed-Integer Programming," Extended Abstract, in *Conference on Optimisation and Learning*, April 2026.

- **G. Maudet**, G. Danoy, "Une Distance pour les Instances de Programmation Linéaire en Nombres Entiers Mixtes," in *Recherche opérationnelle et aide à la décision en France*, February 2026.

- **G. Maudet**, G. Danoy, "A Distance Metric for Mixed Integer Programming Instances," in *Operations Research BELgium*, February 2026.

- A. Vorokhta, **G. Maudet**, G. Danoy, "Generating LB Computation Strategies in a B&B Algorithm: Application to the PFSP," Extended Abstract, in *Conference on Optimisation and Learning*, April 2025.

- **G. Maudet**, M. Batton-Hubert, P. Maille, and L. Toutain, "Grouper les Capteurs Similaires Grace à leurs Données dans le Contexte de Massive IoT," in *26èmes Rencontres Francophones sur les Aspects Algorithmiques des Télécommunications*, May 2024.

- **G. Maudet**, M. Batton-Hubert, P. Maille, and L. Toutain, "Réduction de la Redondance de Messages des Capteurs dans un Contexte Massive IoT," in *25èmes Rencontres Francophones sur les Aspects Algorithmiques des Télécommunications*, May 2023.

- **G. Maudet**, M. Batton-Hubert, P. Maille, and L. Toutain, "Développement de nouvelles stratégies de monitoring grâce a une approche Massive IoT", *Plateform IA*, June 2022.

### Preprints

- **G. Maudet**, M. Batton-Hubert, P. Maillé, and L. Toutain, "Grouping Sensors Based on Observations in a Massive IoT Deployment," Link.

## Supervision

### PhD

2023–Present
- **Alisa Vorokhta**, *PhD student*. Research on the application of machine learning methods to enhance the efficiency of MILP solvers, especially by reducing the impact of the lower bound computation.

### Interns

2025
- **Baka Junior Cedric Ble**, *Master's studen*t (5 months). Worked on clustering methods for MILP instances, aiming to develop a portfolio-based approach where specific MLMILP models are applied to homogeneous groups of instances.

## Supervision (continued)

- **Mathis Da Cunha**, *Master's student* (5 months). Research on the use of genetic programming to define cutting plan selection strategies within branch-and-bound frameworks.

2022
- **Issam Belhorma**, *Master's student* (4 months). Applied kriging-based techniques to estimate sensor positions using returned sensor data and references from known-position nodes.

2021
- **Carlos Delgado**, *Master's student* (3 months). Worked on sensor deployment in vertical green walls for monitoring and regulating soil humidity levels.

### Student jobs

2025
- **Diptaraj SEN**, *Master's student* (5 months, 5 hours per week). Evaluating an heterogeneous benchmark of instances considering an alternative distance metric between instances.

2024
- **Daniele Ferrario**, *Master's student* (3 months, 5 hours per week). Understanding a scientific paper and the code that defines a reinforcement learning method for cutting plan selection.

## Teaching

2024-2025
- Project Lead for student groups at *University of Luxembourg, Esch-sur-Alzette, Luxembourg*. Supervised teams of three master's students in Information and Computer Science, working on research projects for four hours per week over the summer semester.

  2025 • Evaluating the influence of the cutting plan strategy on the solving performance.

  2024 • Evaluating the performance of two lower-bound strategies in the branch-and-bound applied to the Permutation Flowshop Scheduling Problem.

- Lecturer at *University of Luxembourg, Esch-sur-Alzette, Luxembourg*. Taught the winter semester of the first-year master's program in Information and Computer Sciences in an amphitheater. Delivered 4 sessions for 58 students in 2024 and 6 sessions for 62 students in 2025, each lasting 1.5 hours:
  - Introduction to Integer Linear Programming: integer linear programming, branch-and-bound (Slides).
  - Elements of the branch and bound: definitions of different branching and searching strategies (Slides).
  - Population-Based Metaheuristic Algorithms: evolutionary algorithms and swarm intelligence methods (Slides).
  - The Traveling Salesman Problem in a Jupiter notebook: brute force, Integer linear programming resolution, heuristics, and metaheuristics comparison (exercise – with correction).
  - Ongoing Research: hybridization of the branch-and-bound and genetic programming.

## Teaching (continued)

2022 - 2023

- Practice teacher at *IMT Atlantique, Rennes, France*. Supported the first semester of a two-year international master's program in IT, focusing on mathematics and programming foundations. Worked with 12 students in 2022 and 24 in 2023.
  - Matlab - 6h (2022) + 6h (2023): applications to complex numbers, matrix calculations, sequences, and signal processing.
  - Algebra - 6h (2022) + 6h (2023): from linear space definition to eigenvectors.
  - Introduction to Python - 9h (2022) + 9h (2023): lists, functions, focus on *RegEx*, *Numpy*, and *Pandas* libraries.
  - Python for Data Science - 16h (2022) + 16h (2023): from problem definition to supervised and unsupervised algorithm principles. Project: real world data science problem (2022), presentation of a new ML concept (2023).
  - Operational Research - 7h30 (2022): linear programming, integer linear programming, and heuristics. Project: real world problem solved using exact and approximate methods.
  - Probability and Statistics - 4h (2022): generating a random variable from cumulative distribution functions.
  - Signal Processing - 2h30 (2023): harmonics detection, trilateration object positioning.

2012 - 2019

- Private tutor in *Brittany, France*. Provided personalized teaching to primary and secondary school students, averaging two students per week.

## Review Committee

### PC chair

2025-2026

- Shadow PC Chair for the *Algotel-Cores* Conference. Led the organization of the shadow reviewing process, including reviewer recruitment, training sessions, bidding setup, and paper discussions, enabling early-career researchers to engage in a full peer-review cycle without affecting official decisions.

### Reviewing

- Two times reviewed two seven pages double column papers for the *PDCO* Workshop of the international conference *IPDPS*.

2024

- Reviewed one twelve pages double column paper for the international journal *IEEE TNSM*.
- Reviewed one fourteen pages double column paper for the international journal *IEEE Sensors Journal*.

2023

- Shadow reviewed four four-page single-column conference papers for the French national conference "*Cores et Algotel*".

## Scientific Talks

2026
- **Une Distance pour les Instances de Programmation Linéaire en Nombres Entiers Mixtes**, at *ROADEF, Tour, France*.
- **A Distance Metric for Mixed Integer Programming**, at *ORBEL, Leuven, Belgium*.

2025
- **A Distance between Mixed Integer Programming Instances: on the Road to Generalizability of Machine Learning Solving Strategies**, at *ISyE monthly Seminars, UGent, Gent, Belgium* (Seminar webpage).
- **A Distance Metric for Mixed Integer Programming**, at *ECAI, Bologna, USA*.
- **Portfolio Approaches for the Generalizability of ML Solving Strategies in MIP Solvers** at *ZIB seminars, Zuse Institute Berlin, Berlin, Germany* (seminar webpage).
- **A Distance between Mixed Integer Programming instances: on the Road to Generalizability of Machine Learning Solving Strategies**, at *DSD weekly Seminars, IMT Atlantique, Brest, France.* (departement webpage).
- **Search Strategy Generation for Branch and Bound Using Genetic Programming**, at *AAAI, Philadelphia, USA*. Oral presentation and poster. The oral presentation was one of approximately 600 selected from over 3,000 accepted papers at the conference.

2024
- **Grouper les capteurs similaires grâce à leurs données dans le contexte de Massive IoT**, at *ALGOTEL, Saint-Briac-sur-Mer, France*.

2023
- **Energy Efficient Message Scheduling with Redundancy Control for Massive IoT Monitoring**, at *IEEE WCNC, Glasgow, Scotland*.
- **Réduction de la Redondance de Messages des Capteurs dans un Contexte Massive IoT**, at *ALGOTEL, Cargese, France*.

2022
- **New Monitoring Strategies using Massive IoT** , at *Plate-forme Intelligence Artificelle, Saint-Étienne, France*.
- **Emission Scheduling Strategies for Massive-IoT: Implementation and Performance Optimization**, at *IEEE NOMS, Budapest, Hungary*.

2021
- **Poster: Dynamic management of a field of sensors to extend the monitoring time**, at *Symposium IMT: internet du futur, Villeneuve d'Ascq, France*.
- **Strategies for transmitting LoRa wireless sensors to optimize supervision**, at *Journées LPWAN, Clermont-Ferrand, France*.

2019
- Master of ceremonies, at *IMT Atlantique students' graduation ceremony, Nantes, France*.

## Miscellaneous

### Position in Associations and Institutions

2022 - 2023
- **President of the association of PhD students and young researchers** in *IMT Atlantique Rennes*.

2023
- **Representative of the PhD students** for the *doctoral school "SPIN"*.

## Miscellaneous (continued)

### Languages

- French Native, English C1, Spanish B1, Italian B1

### Sports

- Indoor and outdoor climber, rope and boulder. Trail and road runner, hiker. Black belt Judoka.

## References

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