

# GASPARD GOUPY

PHD CANDIDATE · NEUROMORPHIC COMPUTING · MACHINE LEARNING

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## RESEARCH INTERESTS

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Advancing energy-efficient machine learning for edge AI to lower computational costs and environmental impact.

## SKILLS

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**Topics:** Spiking Neural Networks, Neuromorphic Computing, Computer Vision, Deep Learning, Reinforcement Learning

**Technologies:** NumPy, CuPy, PyTorch, Tensorflow, Scikit-Learn, PostgreSQL, Unity, Git, Docker, Linux

**Programming:** Python, C, C++, C#, Java, JavaScript, SQL

## EDUCATION

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### Ph.D in Computer Science

*University of Lille*

Expected Sept 2025

*Lille, France*

- Published at a top-tier AI conference (NeurIPS); Reviewed for a leading AI journal (IEEE TNNLS)

- Led 2 master's research projects at the University of Cluj-Napoca (Romania)

### M.S. in Computer Science, spec. A.I.

*University Claude Bernard Lyon 1*

2022

*Lyon, France*

- Ranks: 10/121 (1st year); 4/31 (2nd year)

- Relevant courses: Machine learning, Reinforcement learning, Bio-inspired computing, IoT, Multi-agent systems

### B.S. in Computer Science

*University Claude Bernard Lyon 1*

2020

*Lyon, France*

- One-year exchange at Tecnológico de Monterrey (2nd best university in Mexico), 2019

## EXPERIENCE

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### Graduate Researcher

*University of Lille*

Oct 2022 – Present

*Lille, France*

- Improved significantly the learning capacity of spiking classification layers trained with supervised STDP by introducing new winner-takes-all competition and homeostasis mechanisms tailored for classification

- Designed a supervised STDP rule outperforming the state of the art by ensuring better control over the firing times

- Developed feedback methods for supervised training of deep Spiking Neural Networks (SNNs), exploring alternatives to backpropagation with a focus on compatibility with on-chip training on neuromorphic hardware

### Research Intern

*Interdisciplinary Institute for Technological Innovation*

Mar 2022 – Sept 2022

*Sherbrooke, Canada*

- First-authored a scientific paper on a novel hardware-friendly unsupervised learning rule in convolutional SNNs, outperforming the state of the art on a speech recognition task

- Designed a low-power acoustic anomaly detection system by implementing convolutional SNNs trained using unsupervised learning to enable constant monitoring of machines with IoT devices

### Full-Stack Developer Intern

*University Jean Moulin Lyon 3*

July 2020 – Sept 2020

*Lyon, France*

- Automated equipment loaning processes by developing a web application for the university intranet

- Implemented a RESTful API with .NET and a client-side UI with Angular

## PROJECTS

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### SpikeNN · [github.com/ggoupy/SpikeNN](https://github.com/ggoupy/SpikeNN)

2024

- SNN framework for classification, implemented in NumPy and Numba for optimized CPU-based processing

- Features event-based processing, first-spike coding, IF/LIF spiking neurons, and STDP-based supervised learning rules

### AutoMiam · [github.com/ggoupy/AutoMiam](https://github.com/ggoupy/AutoMiam)

2022

- Smart IoT pet-feeder system with Arduino, using deep learning (fine-tuned Siamese network) for dog identification and automated food intake regulation, supported by a Python server and Node.js apps

### DofusAISim · [github.com/ggoupy/DofusAISim](https://github.com/ggoupy/DofusAISim)

2021

- Simulation of a tactical RPG game with Unity, focusing on multi-agent systems and AI behaviors with decision trees and reinforcement Q-learning

## PUBLICATIONS

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List of publications available on [Google Scholar](#)

- **G Goupy**, P Tirilly, and IM Bilasco. Neuronal Competition Groups with Supervised STDP for Spike-Based Classification. *Advances in Neural Information Processing Systems (NeurIPS)*, 37, 2025.  
CORE Rank: **A\***
- **G Goupy**, P Tirilly, and IM Bilasco. Paired Competing Neurons Improving STDP Supervised Local Learning in Spiking Neural Networks. *Frontiers in Neuroscience*, 18, 2023. [doi.org/10.3389/fnins.2024.1401690](https://doi.org/10.3389/fnins.2024.1401690)  
Impact Factor: **3.6**
- **G Goupy**, A Juneau-Fecteau, N Garg, I Balafrej, F Alibart, L Frechette, D Drouin, and Y Beilliard. Unsupervised and Efficient Learning in Sparsely Activated Convolutional Spiking Neural Networks Enabled by Voltage-Dependent Synaptic Plasticity. *Neuromorphic Computing and Engineering*, 3, 2023. [doi.org/10.1088/2634-4386/acad98](https://doi.org/10.1088/2634-4386/acad98)  
Impact Factor: **5.8**

## CERTIFICATIONS

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Course “ <a href="#">Linear Algebra for Machine Learning and Data Science</a> ”, DeepLearning.AI	2023
<a href="#">Scientific mediator</a> , University of Lille	2023
Course “ <a href="#">Sharing knowledge with Wikipedia</a> ”, University of Lille	2023
Course “ <a href="#">Latex, advanced level</a> ”, University of Lille	2023
Course “ <a href="#">Effective reading of scientific papers</a> ”, University of Lille	2022
Course “ <a href="#">Computational Neuroscience</a> ”, University of Washington	2022
Specialization “ <a href="#">Deep Learning</a> ”, DeepLearning.AI	2021

## EXTRACURRICULAR

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**Science Communication:** Popularized scientific research for diverse audiences at the University of Lille  
**Open Neuromorphic:** Member of a collaborative community for neuromorphic computing enthusiasts  
**Self-hosting:** I maintain home servers on mini PCs, notably for multimedia streaming and automation  
**Wikipedia contributor:** I created and edited articles in areas of my expertise ([profile](#))  
**Coffee:** I drink specialty coffee and have an interest in the science of coffee brewing  
**Hiking:** I enjoy multi-day hikes with an emphasis on survival and bushcraft  
**Music:** I play piano, mostly classical pieces and Ghibli music