Gaspard Goupy

PhD Candidate · Neuromorphic Computing · Machine Learning
gaspard.goupy@protonmail.com | linkedin.com/in/gaspard-goupy | github.com/ggoupy | ggoupy.github.io

Research interests

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

Skills

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

Ph.D in Computer Science — Expected Sept 2025
University of Lille — *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); Supervised a research intern

M.S. in Computer Science, spec. A.I. — 2022
University Claude Bernard Lyon 1 — *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 — 2020
University Claude Bernard Lyon 1 — *Lyon, France*
- One-year exchange at Tecnológico de Monterrey (2nd best university in Mexico), 2019

Experience

Graduate Researcher — Oct 2022 – Present
University of Lille — *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 — Mar 2022 – Sept 2022
Interdisciplinary Institute for Technological Innovation — *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 — July 2020 – Sept 2020
University Jean Moulin Lyon 3 — *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

SpikeNN · 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 — 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 — 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

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
  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
  Impact Factor: **5.8**

CERTIFICATIONS

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

EXTRACURRICULAR

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