Vadim HEMZELLEC-DAVIDSON

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Objective: 4–6 month internship in AI Research · · · · · · · · · · · · · · · · · **Spring / Summer 2026**

PROJECTS

AI for Sound course projects (Jan 2026)
- Implementation and evaluation of computational audio signal processing and deep learning techniques, including time–frequency representations (STFT, Mel-spectrograms), spectral transformation methods (Phase Vocoder), and audio content analysis (ACR, fingerprinting, feature extraction, audio embeddings), with applications to speech and music audio understanding.

Research Paper Studies & Re-implementations 🌐
- Re-implemented **RLOO** with modified baseline and comparison with PPO / GRPO as well as core components of **CANDI**: hybrid continuous/discrete diffusion models on the Text8 dataset.

DragonLLM — LLM Safety & Guardrails (Jan 2026)
- Developing a real-time toxicity and safety classifier to interrupt harmful generations during inference.
- Inspired by Qwen-Guardrails and circuit-breaker architectures for controllable LLM deployment.

Hi!ckathon (Hi!Paris) Finalist, 2025 🌐
- Ranked **2nd/68 (tied)** in model performance within a team of 6.
- Designed a gated architecture combining a probabilistic router (XGBoost) and expert regressors for zero-inflated targets.

Molecular Graph Captioning — Kaggle Competition, 2025 🌐
- Retrieval-based graph machine learning approach to generate natural language captions from molecular graphs.
- Leveraged graph embeddings for molecule–text alignment in a chemistry-informed setting.

ALTEGRAD (MVA) Labs, 2025 🌐
- Fine-tuned Qwen LLMs with PEFT (LoRA) and implemented preference optimization (GRPO, DRPO).
- Implemented graph ML methods (WL kernels, spectral clustering) and knowledge distillation pipelines.

WORK EXPERIENCE

Blockchain AkademIA, Metz - Internship · Jun 2025 - Aug 2025
Contributed to the regional democratization of blockchain and AI by supporting the integration of a new solution within the company and leveraging N8N for automation workflows.

Aerow, Paris - Internship · Jun 2024 - Jul 2024
Conducted an inventory of potential Research Tax Credit (CIR) eligible topics across all areas of expertise at the company.

EDUCATION

Ecole Polytechnique · 2025 - Present
Master of Science in Data Science
Relevant coursework: Advanced learning for text and graph data (ALTEGRAD - MVA), Deep Learning, Machine Learning, Optimization, Reinforcement Learning, Representation Learning (MVA), **AI for sound: audio processing (STFT, MFCC), speech production, DL for audio (WaveNet, diffusion).**

Telecom SudParis · 2023 - Present
Engineering degree in Applied Mathematics
Relevant coursework: Stochastic Processes, Bayesian Inference (HMM, Particle Filtering), Applied Statistics.

Lycee Fabert · 2021 - 2023
Intensive Preparatory Classes (MPSI–MP*), competitive entrance preparation for top engineering schools.

SKILLS

Programming Languages	Python, C, Java, SQL, Bash
ML / DL	PyTorch, Huggingface, Transformers, vLLM, Scikit-learn, PEFT
Topics	LLM Alignment, RLHF, Graph ML, Diffusion, AI for Sound
Languages	French (native), English (C1), Spanish (B2)
Passions	Tennis, Football, Formula 1, Music (piano, FL Studio), Audio/Video production (sound manager of a video club)