

Yadang Alexis Rouzoumka

ML Research Engineer / Applied Scientist (PhD)

Generative Models, OOD Detection, Radar AI, Signal Processing

Email: rouzoumkaalexis@yahoo.fr · Phone: +33 7 51 25 25 37 · Paris, France

Website: alexis-rouzoumka.pages.dev

GitHub · LinkedIn · Google Scholar

Summary

PhD candidate in machine learning and signal processing at CentraleSupélec / Université Paris-Saclay, conducting research within ONERA / SONDRRA, a France–Singapore research alliance involving CentraleSupélec, ONERA, NUS, and DSO National Laboratories. My work focuses on out-of-distribution detection, generative modeling (variational autoencoders, diffusion models), complex-valued deep learning, and robust radar target detection under challenging noise and clutter. I combine theory-backed modeling, rigorous evaluation, and production-oriented software engineering. Seeking ML Research Engineer, Applied Scientist, or Deep-Tech AI roles in generative modeling, reliable ML, signal intelligence, or radar/defense AI.

Strengths

- **Generative models:** variational autoencoders, complex-valued VAEs, diffusion models, latent-space scoring, representation learning, anomaly and OOD detection.
- **Signal processing & detection:** radar target detection, compound clutter, thermal noise, whitening, detector fusion, off-grid detection, robust scoring under low-SNR conditions.
- **Statistics & evaluation:** uncertainty quantification, bootstrap confidence intervals, ablation studies, distribution shift analysis, leakage-aware validation, rigorous benchmarking.
- **Engineering:** Python, PyTorch, reproducible training/evaluation pipelines, packaging, CI/CD, testing, Docker, Linux, Git.
- **Research profile:** publications in ICASSP, EUSIPCO, GRETSI, submission to ICML and IEEE Transactions on Signal Processing; collaborative academic/industrial work.

Education

PhD in Machine Learning and Deep Learning Applied to Robust Radar Target Detection *Centrale-Supélec / Université Paris-Saclay* 2023–2026 (expected)

In collaboration with ONERA / SONDRRA. Research on OOD detection, generative modeling, complex-valued learning, and robust detection under heavy clutter and thermal noise.

Selected background: statistical learning, stochastic processes, optimization, signal processing, time-series analysis.

Master's Degree in Applied Mathematics and Statistics *Université Clermont Auvergne* 2021–2023

Experience

PhD Researcher *ONERA / SONDRRA — CentraleSupélec / Université Paris-Saclay* 2023–Present
Palaiseau / Gif-sur-Yvette, France

- Develop deep-learning and statistical methods for robust radar target detection under compound clutter and thermal noise.
- Design OOD detection pipelines using VAEs, complex-valued latent metrics, whitening strategies, and diffusion-based methods.
- Run reproducible experiments in Python / PyTorch, including ablations, benchmarking, and statistical analysis on simulated and real maritime radar data.

R&D / Scientific Software Engineer *PHIMECA* 2022–2023
Cournon-d'Auvergne, France

- Worked on uncertainty quantification, reliability studies, Bayesian correction, and scientific software development.
- Developed reusable Python modules and workflows for scientific computing and measurement-error correction.

- Contributed to documentation with Sphinx, CI/CD with GitLab CI and Docker, testing, packaging, and executable delivery.

Teaching Assistant *IUT Computer Science — Université Paris-Saclay*
France

2024–Present

- Teach mathematics for signal processing, Java software development, and SQL/database fundamentals.
- Supervise implementation work, debugging, and structured engineering practices.

Selected Projects

Diffusion-based OOD Detection Research

- Investigate score-based and diffusion-model approaches for out-of-distribution detection, posterior consistency, and interpretable anomaly localization.
- Current work includes GEPC and related directions for reliable generative modeling beyond a single benchmark or modality.

LOB Simulator (side project)

- Ongoing order-book simulation project for market microstructure and execution-policy experimentation.
- An exploratory engineering/research project at the intersection of simulation, structured signals, and decision-making.

Selected Publications

- **GEPC: Group-Equivariant Posterior Consistency for Out-of-Distribution Detection in Diffusion Models**, submitted to ICML 2026, arXiv preprint, 2026.
- **Out-of-Distribution Radar Detection in Compound Clutter and Thermal Noise through Variational Autoencoders**, IEEE ICASSP 2025.
- **Complex-Valued Variational Autoencoders for Radar Detection in Joint Compound Gaussian Clutter and Thermal Noise**, IEEE EUSIPCO 2025.
- **Latent-Space Metrics for Complex-Valued VAE Out-of-Distribution Detection under Radar Clutter**, IEEE ICASSP 2026.
- **Support Vector Data Description for Radar Target Detection**, IEEE ICASSP 2026.
- **Out-of-Distribution Radar Detection with Complex VAEs: Theory, Whitening, and ANMF Fusion**, submitted to IEEE Transactions on Signal Processing, arXiv preprint, 2026.
- **DopplerGLRTNet for Radar Off-Grid Detection**, submitted to EUSIPCO 2026, arXiv preprint, 2026.
- Additional publication: **Détection de cibles radar par auto-encodeur variationnel**, GRETSI 2025. Full list available on personal website / Google Scholar.

Skills

Programming	Python (NumPy, Pandas, SciPy, PyTorch, Tensorflow), R, SQL, Bash, Git, Docker, Linux
Machine Learning	VAEs, diffusion models, OOD detection, anomaly detection, supervised/unsupervised learning, evaluation methodology
Signal Processing	Radar detection, low-SNR settings, clutter modeling, latent metrics, whitening, fusion with classical detectors
Research Engineering	Reproducible experiments, ablations, bootstrap CIs, CI/CD, testing, packaging, documentation
Languages	French (native/fluent), English (professional), Spanish (basic)

References

Available upon request.