Julien de Saint Angel

AI & Applied Mathematics Engineer

PhD in Applied Computer Science – specialized in hyperspherical neural networks and anomaly detection

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Education

2020–2025 **PhD in Applied Computer Science**, *University of La Rochelle, MIA Laboratory*
Thesis: "Hyperspherical Layer Neural Networks for Anomaly Detection".

2017–2019 **Master in Mathematics and Applications (Merit)**, *University of La Rochelle*
Specialization: applied mathematics, optimization, differential equations.

2014–2015 **Master in Astronomy and Physics**, *Paris-Meudon Observatory*

2012–2014 **Master in Mathematics and Education + CAPES**, *University of La Rochelle*

2009–2012 **Bachelor in Mathematics**, *University of La Rochelle*

Professional Experience

Scientific Contributions (2021–2024)

Deep M-SPH SVDD — Multi-hypersphere method for anomaly detection.

Initialization — Dedicated initialization method for hyperspherical layer networks (numerical optimization).

Applications — Anomaly detection in time series, visual tide gauge analysis, high-frequency sports analytics.

Feb.–May 2019 **Internship at XLIM (UMR 7252) and MIA (EA 3165)**
Supervisors: B. Tremblais and R. Pétéri
Characterization of sports gestures using high-speed cameras and critical point trajectory analysis.

May 2018 **Internship at LIENSs Laboratory (UMR 7266)**
Supervisors: E. Poirier (IGR) and L. Testud
Development of a visual tide gauge: automated reading of tide scale images.

Mar.–Jun 2015 **Internship at SYRTE Laboratory (UMR 8630)**, *Paris Observatory*
Supervisor: J.-Y. Richard
Development of interpolation algorithms for artificial satellite orbits (differential equations, numerical simulation).

Technical Skills

AI — CNN, RNN/LSTM, GAN, Transformers, autoencoders, surrogate models, Bayesian optimization.

Frameworks — TensorFlow/PyTorch, Scikit-Learn, OpenCV, PyTorch Lightning, Keras.

Signal Processing — Segmentation, frequency filtering, wavelets, Fourier transform, time-frequency analysis.

Programming — Python (Numpy, Pandas, SciPy, Matplotlib), Java, C, C++, Fortran, MATLAB, Scilab.

Tools — Git, Docker, Jupyter, Linux, LaTeX, Microsoft Office (Excel, Word, PowerPoint).

Advanced Mathematics — Optimization, PDEs, conformal geometry, universal approximation.

Selected Publications

[1] **J. de Saint Angel**, C. Saint-Jean, C. Choquet, *Improving Learning for Deep Multi-Sphere Anomaly Detection with Conformal Geometric Algebra*, book chapter, Recent Applications in Deep Learning, 2025.

[2] **J. de Saint Angel**, C. Saint-Jean, *Dense and Conv2d Hyperspherical Layers via Conformal Geometric Algebra*, ORASIS, 2021.

[3] **J. de Saint Angel**, C. Saint-Jean, *Approximation Theorem for Hyperspherical Neurons*, GRETSI, 2023.

[4] **J. de Saint Angel**, C. Saint-Jean, *Multi-Spheres Anomaly Detection with Hyperspherical Layers*, ICMLA, 2024.

Languages

Languages — French (native), English (B2 – fluent), Spanish & Romanian (B1).

Interests

Scientific outreach, astrophotography, bird photography, 3D modeling, video animation.

Keywords — Artificial Intelligence, Anomaly Detection, Image Processing, Signal Processing, Image Analysis, Segmentation, CNN, RNN, LSTM, LLM, Optimization, Python, Pandas, Docker, Git, Jupyter, LaTeX, Data Analysis, AI Agents, MLOps