Sasha Sutton

Master's student — Data, Knowledge & Hybrid Artificial Intelligence (DKAI), Université Paris-Saclay | NLP & Computer Vision

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Education

Université Paris-Saclay Sept. 2026 – June 2027
Master 1 in Computer Science — Data, Knowledge & Hybrid Artificial Intelligence (DKAI) *Gif-sur-Yvette, France*
- Selective AI track taught in English: **machine learning**, **big data**, **symbolic & hybrid AI**.

Aix-Marseille University Sept. 2026 – June 2027
Bachelor of Science in Mathematics (L3, double-degree programme) *Marseille, France*
- Second bachelor's degree completed **alongside the M1**, deepening the mathematical foundations of AI.

Aix-Marseille University Sept. 2023 – June 2026
Bachelor of Science in Mathematics and Computer Science *Marseille, France*
- **Relevant Coursework:** Data Structures and Algorithms (Java), Probability & Statistics, Object-Oriented Programming (Java), Linear Algebra, Calculus

Middlesex University October 2023
Bachelor of Arts in Music Production & Sound Engineering *London, UK*

Experience

Laboratory of Computer Science and Systems (LIS) Apr. 2026 – Jul. 2026
Natural Language Processing (NLP) Intern *Marseille, France*
- Developed **Retrieval-Augmented Generation (RAG) systems** by designing and implementing conversational AI pipelines for historical web archives from the **BnF** and **INA**.
- Performed **topic modelling and semantic theme extraction** on large-scale heterogeneous web-archive (WARC) datasets to automate the discovery of historical trends and key themes.

Micron Applied Dentistry SAS Sep. 2025 – Dec. 2025
Statistical Data Analyst Intern *Marseille, France*
- Built a **Python data-processing pipeline** to clean and aggregate **126 high-resolution 3D dental scans** with noise filtering and statistical averaging.
- Designed a **reproducibility validation framework** using pixel-wise standard deviation maps, spatial aggregation and a **one-sided Student's t-test** to verify sub-20 µm precision.
- Developed an **automatic anatomical landmark detection algorithm** using cubic polynomial regression and second-derivative analysis to distinguish **soft vs. hard tissue regions**.
- Performed **power analysis and Monte Carlo simulations** and produced **publication-quality visualisations** for PhD thesis validation reports.

Research & Publications

"De la propagation avant à la rétropropagation : une analyse des mécanismes d'apprentissage dans les réseaux de neurones multicouches" — research article on the mathematical foundations of multilayer perceptrons (backpropagation, gradient descent, regularisation), Aix-Marseille Université, 2026. hal.science/hal-05628568

Projects

Neural Vision 3D – Interactive Machine Learning Visualizer | *React*, *Three.js*, *Python*, *FastAPI*, *NumPy*, *TypeScript*
- Developed an interactive 3D visualization of a Neural Network from scratch using **React Three Fiber (Three.js)**, allowing users to inspect real-time neural activations in a 784-64-10 architecture.
- Engineered the inference engine in **Python/NumPy** — manual forward pass with Sigmoid and Softmax activations, no high-level ML libraries — served via a **FastAPI** REST API for real-time recognition of hand-drawn digits.

Vector Search Engine (RAG Backend) | *Python*, *FastAPI*, *React*, *NumPy*
- Built a semantic search engine from scratch, implementing Cosine Similarity via matrix multiplication to rank documents by meaning rather than keywords, with **Sentence-Transformers (BERT)** 384-dimensional embeddings.
- Deployed a full-stack microservices architecture: FastAPI backend on Render and React frontend on Vercel, connected via REST APIs.

Air Harp – Computer Vision Musical Instrument | *Python*, *OpenCV*, *MediaPipe*, *Pygame*
- Built a real-time virtual instrument that tracks finger movements with **MediaPipe hand-landmark detection** and **OpenCV**, triggering low-latency multi-channel audio when fingers pluck virtual strings.

Technical Skills

Languages: JavaScript (ES6+), TypeScript, Python, Java, C, SQL (PostgreSQL, Supabase).
Frontend/3D: React.js, Next.js, Tailwind CSS, Shopify/Liquid, Bootstrap.
Backend/Cloud: Node.js, FastAPI, Express.js, Spring Boot, AWS (S3, EC2, Lambda), REST APIs.
AI & Data: NumPy, PyTorch, TensorFlow, Sentence-Transformers (BERT), OpenCV, MediaPipe, Pandas, Matplotlib.
Concepts: Retrieval-Augmented Generation (RAG), Topic Modelling, Neural Network Architectures, Vector Embeddings, Statistical Testing, Database Normalisation.

Social Engagements

Achievements: 1st Place Hackathon Winner (AMU 2026).
Memberships: Chess Club and Mathematics Club at Aix-Marseille University.
Interests & Sports: Mountain Cycling, Marathons, Kickboxing, Strategic Games.