

Aidin Attar

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Profile

Machine learning engineer and physicist with a strong background in data-driven modeling and computational methods. I hold an MS in Physics of Data and I am currently pursuing a PhD in Information Engineering, focusing on neuromorphic computing and spiking neural networks. I have hands-on experience in designing end-to-end ML, from data preprocessing to deployment, working with deep learning, multimodal architectures, SNNs, and large-scale pipelines. My work combines rigorous scientific thinking with practical engineering, aiming to develop efficient, interpretable, and biologically inspired machine learning models for real-world applications.

Research Interests: Neuromorphic computing, spiking neural networks, STDP/R-STDP learning, efficient deep learning, biologically inspired algorithms, and edge intelligence.

Education

Università degli Studi di Padova, PhD in Information Engineering Nov 2025 – Present

- Research focus: neuromorphic computing, spiking neural networks, and biologically inspired learning algorithms (STDP, R-STDP, surrogate gradient methods).
- Developing efficient and interpretable deep SNN architectures for low-power edge intelligence and real-time perception. Working under the supervision of Prof. Michele Rossi (SIGNET Group), integrating theoretical research with implementation on neuromorphic hardware platforms.

Università degli Studi di Padova, MS in Physics of Data Sept 2021 – Dec 2024

- GPA: 110/110 cum laude
- **Coursework:** Machine Learning, Deep Learning, Statistical Mechanics, Theoretical Physics Models, Computational Physics, Human Data Analytics, Big Data, Financial Mathematics
- **Thesis:** Exploration of Deep Spiking Neural Network Architectures for Reward-Modulated STDP Learning ([link](#))

Università degli Studi di Padova, BS in Physics Sept 2017 – Apr 2021

- GPA: 106/110
- **Coursework:** Classical Mechanics, Quantum Mechanics, Electromagnetism, Thermodynamics, Computational Physics, Mathematical Methods in Physics, Experimental Physics, Solid State Physics, Programming in Python, Data Structures and Algorithms, Numerical Methods, Scientific Computing, Data Analysis and Visualization
- **Thesis:** Search of gravitational waves signal due to post merger phase of neutron star binary merger ([link](#))

Liceo Scientifico A. Roiti – Ferrara, Italy, High School Diploma Sept 2012 – July 2017

- GPA: 100/100
- Focused on mathematics, physics, and computer science, laying the foundation for my technical and analytical skills.

Experience

Machine Learning Engineer, Competitor – Deda Stealth, Modena, Italy May 2025 – Nov 2025

- Designed and maintained multimodal classification pipelines combining vision and language models, tailored to real-world e-commerce scenarios for product attribute enrichment.
- Developed and fine-tuned deep learning models for gender, age, and category recognition, integrating custom post-processing and normalization workflows.
- Contributed to CI/CD infrastructure and modular ML system design, supporting experimentation, evaluation, and scalable deployment of production-ready models.

Research Intern, SIGNET LAB – Padova, Italy Mar 2024 – Dec 2024

- Conducted research on Spiking Neural Networks under the supervision of Prof. Michele Rossi, focusing on object detection and achieving state-of-the-art results.
- Designed and implemented SNN models using Python, PyTorch, snntorch, and SpykeTorch, optimizing performance for real-world applications.
- Developed novel algorithms for object detection, improving accuracy and efficiency compared to existing methods.

- Designed and implemented machine learning models to analyze and predict complex systems, with applications in algorithmic decision-making.
- Developed a Python-based framework for backtesting and deploying predictive models in real-time environments.
- Applied advanced machine learning techniques, including time-series forecasting and deep learning, to improve model accuracy and performance.
- Integrated data pipelines from multiple providers and platforms, ensuring efficient data processing and analysis.

Private Tutor, One-on-One Lessons – Ferrara, Italy

Oct 2018 – Present

- Provided private lessons in mathematics, physics, and computer science to high school and university students.
- Helped students improve their grades and understandings by adapting teaching materials to their individual needs.
- Developed strong communication, critical thinking, and time management skills.

Technologies

Languages:	Python, C++, C, Objective-C, SQL, Julia, R, VHDL, \LaTeX	ML Frameworks:	TensorFlow, PyTorch, Scikit-learn, XGBoost, SpikingJelly, snnTorch
Data Analysis:	NumPy, Pandas, Matplotlib, SciPy, ROOT	Big Data:	Kafka, Dask, PySpark
Hardware:	VHDL, Vivado, FPGA	Version Control:	Git, GitHub, GitLab
Cloud:	AWS S3, Google Cloud	Dev Tools:	VS Code, \LaTeX , SSH, Windows, Linux

Projects**Object Recognition using SNNs**github.com/aidinattar/snn

- Developed and implemented spiking neural network architectures, training them using biologically inspired reward-modulated spike-timing-dependent plasticity learning rules that closely mimic the neural mechanisms observed in the brain, offering significant potential advantages in both computational efficiency and power consumption compared to traditional ANNs.
- *Tools Used:* Python, PyTorch, snnTorch, SpykeTorch

Delay Time Distribution of Binary Compact Objectsgithub.com/aidinattar/BBH-Delay-Time

- Conducted research on gravitational waves and binary compact objects, calculating delay time distributions using Runge-Kutta methods. Implemented adaptive time-step algorithms to optimize computational efficiency and trained random forest models to predict delay times with high accuracy.
- *Tools Used:* Python, NumPy, SciPy, PyROOT, Scikit-learn, XGBoost, TensorFlow.

Small-footprint Keyword Spotting with CNNsgithub.com/aidinattar/AudioKWS

- Designed and implemented a CNN-based keyword spotting system to detect specific words in speech, optimized for low-resource, edge-computing applications. Utilized the Google Speech Commands Dataset and extracted log Mel filterbank coefficients for feature extraction.
- *Tools Used:* Python, TensorFlow/Keras, scikit-learn

Patient Activity Recognition with Radio Wavesgithub.com/aidinattar/radio-wave-activity-detection

- Developed a contactless human activity recognition system using radar devices for healthcare and security applications. Explored mDoppler generation using GANs to create realistic synthetic data, reducing the need for extensive real-world data collection. Built end-to-end pipelines for data preprocessing, model training, and evaluation, achieving high accuracy in activity recognition.
- *Tools Used:* Python, PyTorch, OpenCV, scikit-learn

Real-Time Cosmic Ray Detectiongithub.com/aidinattar/CosmicRays-LiveDashboard

- Developed a real-time data processing pipeline for cosmic ray detection using Drift Tubes detectors, enabling live monitoring of detector quality. Processed and analyzed muon hits using distributed frameworks and streamed results for real-time visualization. Built a live dashboard to display statistics and analysis.
- *Tools Used:* Python, Kafka, PySpark, S3, Bokeh/Matplotlib.

Particle Decay Reconstructiongithub.com/aidinattar/cxx-particle-reco

- Developed a C++-based simulation and analysis framework to reconstruct the decay of strange particles (K_S^0 and Λ^0) and compute their invariant mass and decay time. Implemented object-oriented programming principles, including classes, inheritance, and STL containers.
- *Tools Used:* C++, ROOT, STL, object-oriented patterns.

Hobbies

Cinema, chess, 3D printing (Anycubic Kobra 2 Neo), and reading fiction and philosophy.