

SALMA ZAINANA

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EDUCATION

Stanford University — Stanford, CA Sep 2023 – Mar 2028 (expected)
Ph.D., Computational and Mathematical Engineering (ICME); advised by Prof. Manuel Rivas
Coursework: Applied Statistics, Causal Inference, Optimization, Machine Learning for Algorithmic Trading

École Polytechnique — Palaiseau, France Sep 2020 – Jun 2023
B.S., Mathematics and Computer Science
Coursework: Probability, Statistics, Convex Optimization, ML / DL, NLP

QUANTITATIVE RESEARCH & TRADING PROJECTS

Algorithmic Market Making — Stanford (MS&E 242) May 2025

- Researched and backtested automated market-making strategies on **tick-level NYSE TAQ data**; built sequence-model quoting policies (GRU, LSTM) and benchmarked against static spread-setting baselines across large-cap U.S. equities.
- Implemented an event-driven backtester in Python that reconstructs limit-order-book state and tracks inventory, fills, and P&L tick-by-tick.
- Through regime-level attribution, traced the strategy's aggregate edge to two strongly trending ticker-days — showing the signal was **regime-driven rather than robust**, and motivating regime-aware evaluation before any live deployment.

Distributionally Robust Portfolio Optimization — Stanford Apr – May 2025

- Developed a **Wasserstein-DRO** framework for mean-variance and CVaR optimization; reformulated as a convex program and translated the model into production-style Python (CVXPY, MOSEK Fusion).
- Calibrated the ambiguity radius via concentration bounds, cross-validation, and bootstrap; achieved lower out-of-sample variance and higher risk-adjusted returns than sample-average optimization with **100% feasibility** across 200 simulated markets.

RESEARCH EXPERIENCE

Graduate Researcher, Rivas Lab — Biomedical Data Science, Stanford Sep 2024 – Present

- Lead an independent research program applying **time-series and time-frequency (wavelet) methods** to noisy, high-frequency biosignals — extracting predictive features from **47K+ 12-lead ECG records** (UK Biobank) on Slurm HPC.
- Built high-dimensional regression pipelines with group-lasso and elastic-net selection across correlated channels; identified **67 significant loci** and 101 fine-mapped signals, with rigorous controls for confounding and multiple testing.
- Diagnosed and corrected a boundary-artifact bug (edge effects contaminating low-frequency features) that had inflated signal in the pipeline — first-author paper accepted at **RECOMB 2026**
doi.org/10.64898/2026.05.20.26353725.

Research Assistant, PSAAP Center — Stanford Jan – Jun 2024

- Built a label-efficient 3D pattern-recognition model (**AUC 0.999** using <0.5% of pixels), outperforming 2D / 3D U-Net baselines; paper under review at TPAMI.

INDUSTRY EXPERIENCE & ADDITIONAL

Machine Learning Engineer Intern — Cadence Design Systems Jun – Sep 2024

- Built a database-backed operator-coverage pipeline (relational schema, stagewise stats) automating compiler validation and cutting manual checks **80%+**.

NLP / LLM Research — Microsoft × Stanford ICME collaboration 2024

- Contributed Tree-of-Attacks-with-Pruning and GCG adversarial-attack implementations to Microsoft's open-source PyRIT red-teaming framework (Stanford collaboration; credited in the PyRIT paper, [arXiv:2410.02828](https://arxiv.org/abs/2410.02828)); evaluated TAP on GPT-4 and Llama-3-8B, reaching up to **98% attack success**.

Teaching Assistant, Stanford — ME 300A: Linear Algebra (~100 students); ME 123: Computational Engineering.

TECHNICAL SKILLS

Programming: Python (NumPy, pandas, scikit-learn, PyTorch), C / C++, R, Julia, MATLAB

Tools: CVXPY, MOSEK, Git, Linux / Slurm HPC

Languages: French (C1), English (TOEFL 107), Arabic (native), Russian (B1)