Koza Kurumlu

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Summary

Gap year student. Researcher/engineer focused on neuromorphic ML, computational neuroscience, computer-vision and LLM applications.

Experience

NeuroAI Research Intern, University of Bath – Internship — Jul 2024 – Present

- Brain-inspired ML research with organoids, BCIs, energy-based models, and active inference.
- Decoding noisy biological time-series data using spiking reservoir and energy-based model.
- Analysing stimulation-response dynamics of Shell-MEA Organoid recordings using resonant reservoirs.

AI Engineer Intern, Luca Health – London, UK — Jul 2025

- Built a computer-vision ML pipeline to track pupil velocity for concussion management and integrated it into Luca Health's mobile app.
- Focused on robustness to lighting/occlusion and mobile-appropriate latency; integrated into app.

Quantitative Research Intern, Paritra Investment Research LTD — Dec 2023 – Jan 2024

- Conducted research and developed an options trading algorithm for the NIFTY 50: data ingestion, factor engineering, and backtests; documented assumptions and risks.

UCL Medical Image Computing Summer School Project, UCL – London, UK — Jul 2023

- Implemented temporal transformer models to recognise surgical gestures on data from the da Vinci Surgical System (dVSS).

AI Research Intern, Apricity Fertility – London, UK — Jun 2023 – Jul 2023

- Developed a computer-vision pipeline for cervicovaginal mucus (CVM) detection to empower fertility awareness; poster accepted at Fertility 2024 (see Publications).

Software Engineer Intern, Vestico – London, UK — Jul 2022 – Aug 2022

- Delivered an image-recognition pipeline to detect fashion products from non-standard social media posts.

Global Teens in AI Accelerator, Teens in AI — Jul 2021 – Aug 2021

- Built Ophelia, a wildfire resource-allocation project using genetic algorithms; won the accelerator and pitched at the UN AI for Good, HSBC, and NVIDIA events.

Publications

From Shell-MEA Recordings to Neuromorphic Models: Causal Graphs and Resonant Reservoir Computing in Brain Organoids — Under review

Koza Kurumlu, Robert Clarke
Submitted to: Frontiers Research Topic "Neuromorphic Engineering in Wetware". Status: under review.

ECG Signal Imputation using Reservoir Computing Energy-Based Models — Under review

Koza Kurumlu, Robert Clarke
Submitted to: Northern Lights Deep Learning Conference (NLDL 2026). Status: under review.

Automated cervicovaginal mucus detection for empowering fertility awareness — 2024

Koza Kurumlu, Devika Nair, Céline Jacques, Chloe He
Fertility 2024 (poster/abstract). Publisher page:
https://www.tandfonline.com/doi/full/10.1080/14647273.2024.2340788

Projects

Active Inference from Scratch – Personal Research Project

- Minimal comparison of Active Inference vs. Q-learning on a maze task with increasing sensor noise. *Result:* Active Inference accuracy degrades less (9.7%) compared to Q-learning (11.4%) as noise increases; includes CLI to reproduce plots.

Code: https://github.com/kozakurumlu/Active-Inference-from-Scratch

Reservoir Computing from Scratch to Improve ML Classification Accuracy – Personal Research Project

- Implemented a static Liquid State Machine (LSM) that improves temporal classification accuracy when using a light-weight model by increasing data dimensionality: 54.5% to 77.2%.
- Includes demo, saved states, and an EBM or linear readout prototype.

Code: https://github.com/kozakurumlu/LSMOrganoid

Detection of Mugging using Audio-Emotional Cues and Deep Learning – Personal Research Project

- Audio analysis to detect mugging/suspicious activity; dataset curation, training scripts, and realtime inference prototype.

Code: https://github.com/kozakurumlu/MuggingDetection

Pebble – Distributed AI Training – The Earth Prize 2024 Runner-Up

- Pools idle consumer GPUs into a decentralized cluster for distributed AI training, using Kubernetes and load balancing.
- Selected global finalist and runner-up at The Earth Prize 2024.

Coverage: https://www.theearthprize.org/the-earth-prize-2024/pebble

Eleos Maps – Hoberman Entrepreneurship Prize 2024

- Risk-aware routing app: ingests police/crime data, computes danger scores on graph edges, and produces safer paths; web/mobile prototype.

Code: https://github.com/kozakurumlu/EleosMaps
Coverage: https://www.teensinai.com/teens-in-ai-alum-kozo-kurumlu-launches-eleos-app/

Numerically Modeling Rutherford Scattering – Eton Computational Physics Prize 2022

- Numerical simulation of α-particle scattering that reproduces classic distributions; write-up and code included.

Code: https://github.com/kozakurumlu/Numerically-Modelling-Rutherford-Scattering
Paper: https://www.academia.edu/78749957/Numerically_Modelling_Rutherford_Scattering

Ophelia – Wilfire Response Simulation – Teens in AI 2021 Winner

- Team project using genetic algorithms to optimize resource allocation during wildfires; presented at the UN AI for Good event.

UN AI for Good talk: https://youtu.be/JH5bICchjOg?t=4527

Technologies

Languages: Python, Swift, JavaScript, TypeScript, SQL

ML/AI: PyTorch, TensorFlow, NumPy, pandas, scikit-learn, OpenCV, LangChain, Hugging Face

App/Web & Tools: Node.js, React, REST; SwiftUI/Combine,Git, Jupyter; some Docker; pytest/XCTest

Education

Eton College   2020–2025

- A-Level Grades: **A*** Mathematics, **A*** Physics, **A** Further Mathematics, **A** Computer Science
- Activities: Head of Entrepreneurship Society; Head of Computer Science Society; Basketball 1st Team Captain

Summerfields, Oxford   2016–2020

Languages: English, Turkish, Mandarin Chinese (fluent); Spanish (conversational)