

Mina Heinein

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M.Sc. (M2) in AI and Digital Health
Université PSL, Paris (from Sept 2026)
B.Sc. in Systems Biomedical Engineering, Cairo University

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EDUCATION

- **M.Sc. (M2) in AI and Digital Health (ST4Health), Université PSL** 2026 - 2027
Paris, France
- **B.Sc. in Systems & Biomedical Engineering, Cairo University** 2021 - 2026
Cairo, Egypt
Relevant Coursework: Machine Learning, Deep Learning, Computer Vision, Medical Imaging, Data Structures, Algorithms, Object-Oriented Programming (OOP), Digital Signal Processing (DSP), Embedded Systems, Computer Architecture, Biomedical Instrumentation.

EXPERIENCE

- **Software Engineering Intern – EJADA** Aug - Sep 2025
 - Built Customer Relationship Management (CRM) solutions on Microsoft Dynamics 365 with retail and corporate customer portals, implementing field specifications, form layouts, and validation rules for contact and account management.
 - Developed REST and SOAP web services for case data retrieval, created web resources for dashboard integration, and implemented custom .NET plugins and automated business rule enforcement.
 - Created an end-to-end case management workflow with automated routing rules, status tracking, SLA implementation, and email notifications, supporting multiple case types including credit card operations.
- **Web Development Intern – NAID** Jul - Sep 2024
 - Developed dynamic web applications, integrating assistive technology for enhanced accessibility.
 - Deepened knowledge in web development, IoT technologies, and assistive technology, focusing on user experience and scalable systems, with a focus on users with mobility, sensory, or cognitive challenges.

PROJECTS

- **MedHyperGraph: EHR-Integrated Multimodal Hypergraphs for Clinical VQA – Thesis**
 - **in collaboration with:** the German Research Center for Artificial Intelligence (DFKI).
 - **Awarded research funding by:** the Academy of Scientific Research and Technology (ASRT) & ITIDA.
 - **Under review:** MICCAI 2026 (first author).
 - Constructed patient-specific multimodal hypergraphs for medical visual question answering, unifying structured EHR events, prior-report entities, cross-modal grounding, SNOMED CT ontology concepts, and image regions in one temporally indexed structure.
 - Developed temporally-aware multimodal retrieval with leakage control, scoring evidence by textual, visual, temporal, and hypergraph proximity to build compact evidence subgraphs for VLM answer generation.
 - Achieved 72.63% accuracy on the EHRXQA benchmark (n=1,900), surpassing the RL-trained state of the art (70.43%) without task-specific training, and +10 weighted-F1 on open-ended questions (multi-study: 5.2 → 43.4).
 - Technologies: Python, PyTorch, Knowledge graphs, Hypergraphs, RAG, graphRAG, VLMs, Neo4j.
- **SignalSuite Toolkit 🎧** – a comprehensive signal processing toolkit featuring these specialized applications:
 - **Multi-Port Signal Viewer:** Real-time medical signal analyzer for ECG/EEG with automated reporting.
 - **Signal Equalizer:** Featuring vocal extraction from songs, animal/music sound separation, and Wiener noise filtering, real-time frequency manipulation, dynamic spectrograms, and FT visualization.
 - **Shazam-like App:** Audio Fingerprinting using similarity matching algorithms for music identification.
 - Technologies: Python, PyQt5, Numpy, Scipy, OpenCV, Matplotlib, Pyaudio.

- **Computer Vision Toolkit 🤖** – a comprehensive computer vision toolkit featuring these specialized applications:
 - **Image Processing:** providing fundamental operations such as histogram equalization, noise addition, spatial/frequency filtering, thresholding, edge detection using Sobel, Canny and Active Contours(Snakes).
 - **Feature Matching:** Harris & SIFT feature detection, template (SSD/NCC), and SIFT feature matching.
 - **Image Segmentation:** Separates healthy from diseased tissue via K-Means, Region Growing, OTSU
 - **Face Recognition System:** Detects and identifies faces in images using feature-based recognition
- **Eduokee 🎵** – An interactive lyrical learning platform with real-time feedback and language enhancement.
 - Integrated Spotify API for login, playlist access, music playback increasing user engagement by 45%.
 - Used Google Cloud Speech API and a Levenshtein Distance algorithm to assess users' singing accuracy.
 - Added clickable lyrics for instant dictionary definitions, optimized the platform for desktop and mobile.
 - Technologies: ReactJS, NodeJS, Spotify Web API, GitHub Pages.
- **AVR-Based Smart Home System 🏠** – an IoT solution for monitoring and real-time control of home appliances.
 - Implemented bare-metal custom driver development for LCD, DIO, Interrupts, and UART.
 - Integrated ESP32 for Wi-Fi connectivity, enabling remote monitoring and control via a web interface.
 - Technologies: Embedded C, IoT, Wi-Fi protocols, Proteus, Web APIs, Hardware-software integration.
- **Puppets.eg 🛒** – A Full-stack E-Commerce Platform with a seamless purchasing workflow.
 - Developed responsive React app with product listings, shopping cart functionality, and checkout process. Implemented custom orders allowing users to personalize products, increasing conversion rates by 25%.
 - Created an admin dashboard for product and order management, reducing order processing time by 60%.
 - Technologies: ReactJS, Express.js, MongoDB, Tailwind CSS, Multer, Cypress.
- **Chess Game ♟️** – OOP-based chess game with features like piece promotion, castling, and a customizable timer.
 - Implemented classic chess rules such as pawn promotion, castling, and piece movement mechanics.
 - Created an intuitive GUI with visual indicators for legal moves, move history tracking and a timer feature.
 - Technologies: Java, OOP, Java Swing (for GUI), Game Logic Design.

COURSES AND CERTIFICATIONS

- **12 Month ALX Software Engineering Programme with a specialization in Front-end** *Nov 2024*
 - Completed an intensive project-based curriculum, building a strong foundation in a variety of programming languages, data structures, and algorithms.
 - Gained experience in Systems Engineering/DevOps, web server configuration (Nginx), load balancing.
 - Became proficient in collaborative development and problem-solving through mock interviews and technical whiteboarding.
- **ITI Embedded Systems Diploma** *Aug 2024*
 - Gained practical experience in microcontroller interfacing, and real-time operating systems.
 - Developed a comprehensive understanding of embedded systems by completing coursework in C programming, Embedded System Architecture, and Automotive Bus Technology.

TECHNICAL SKILLS

Languages: C, Python, Java, JavaScript, Bash Scripting

AI/ML: PyTorch, RAG/GraphRAG, Knowledge Graphs & Hypergraphs, Vision-Language Models (VLMs), LLM-based evaluation, Ontologies (SNOMED CT)

Frameworks: .NET, React, Node.js, NestJS, Flask

Libraries: OpenCV, NumPy, Pandas, Matplotlib, OpenGL

Databases: MongoDB, MySQL, PostgreSQL, Neo4j

Tools & Platforms: Microsoft Dynamics 365, Linux, Git, Qt, SOAP & REST APIs

Hardware & Embedded: AVR (Atmega32), ARM (STM32)

LANGUAGES

English: IELTS Academic Band 8.0

French: B2

Arabic: Native

EXTRA-CURRICULAR ACTIVITIES

- Participated in Research Days, presenting work on Computational Modelling of the Neuromuscular Junction in Myasthenia Gravis.
- Designed and delivered weekly lessons for a Sunday school program to a class of children (ages 6-8), fostering a positive and interactive learning environment.