Zein Shehabeddine

MSc. Computer Science · Graduate Research Assistant

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Summary

I am a computer science researcher interested in applied machine learning, as well as cybersecurity and low-level programming. My work spans clinical prediction models, genetic variant classification, and applied systems projects such as autonomous decision-making systems.

Education

American University of Beirut (AUB) *Beirut, Lebanon*
Master of Science (MS) in Computer Science [GPA: 4.0] *2024 – Present*
- Graduate Research Assistant

American University of Beirut (AUB) *Beirut, Lebanon*
Bachelor of Science (BS) in Computer Science [GPA: 3.7, Major GPA: 4.0] *2021 – 2024*
- Education Above All Scholarship

Experience

American University of Beirut (AUB) *Beirut, Lebanon*
Graduate Research Assistant *2025 – Present*
- Conducting research in applied machine learning and bioinformatics, including clinical outcome prediction, genetic variant classification, autism speech analysis, and bacterial operon annotation.
- Instructing and preparing computer science lab sessions ranging from cybersecurity to data structures and algorithms; developing lab materials, teaching weekly sessions, and grading assignments.

American University of Beirut (AUB) *Beirut, Lebanon*
Competitive Programmer *2021 – 2023*
- Solved 150+ Project Euler problems and participated in competitive programming contests.
- Awarded the Late Henri Qais Naccache Competitive Programming Award.

American University of Beirut (AUB) *Beirut, Lebanon*
ABLE Hackathon Finalist *2021*
- Led a team to develop a real-time sign language translation system using TensorFlow, OpenCV, and custom data collection pipelines.

Publications

An Equity-Driven Framework for BRCA1/2 Variant Interpretation in Data-Limited Populations: Integrating Global Supervised Learning with Population-Aware Anomaly Detection *Manuscript under review*
R. Assaf, Z. Shehabeddine, H. Saad, N. Assaf *2025*
- Developed a hybrid framework that combines supervised learning with population-aware anomaly detection to improve BRCA1/2 variant interpretation in data-limited populations.

Screening Autism Spectrum Disorder in Children Using Speech Transcripts *Scientific Reports (Nature Portfolio)*
R. Assaf, Z. Shehabeddine, V. Ramesh *2025*
- Developed speech transcript ML pipelines for ASD screening, offering a privacy-preserving alternative to audio/video modalities.

A Lightweight Neural Network for Arabic Sign Language Recognition Using Mediapipe Landmarks *Preprint*
Z. Shehabeddine, R. Fidawi, R. Assaf *2024*
- Designed lightweight landmark-based models for static and dynamic ArSL recognition with competitive accuracy and minimal parameters.

Selected Projects

Zero-Knowledge Battleship.
Built a Battleship game where every move is accompanied by a Groth16 zero-knowledge proof using gnark, so players can prove the legality of their shots without revealing their boards. Designed and implemented the full proving and verification pipeline, including board commitments and hit/miss logic encoded in custom circuits.

Labeeb: Lebanese Sign Language Translator.
Built the first Lebanese Sign Language translation app end-to-end, from data collection and neural models to the backend API and mobile frontend. Led to a preprint on lightweight Arabic Sign Language recognition using landmark-based representations.

Connect Four Engine.
Led a team of four to design and implement a high-performance Connect 4 AI in C using negamax with iterative deepening and null-window search. The engine won an internal department competition against other student bots and outperformed public online bots as well.

Skills

Programming	Python, C, Java, Bash
Machine Learning	Feature Engineering, Deep Learning, Clinical ML, Statistical & Data Analysis
Systems	Linux, Low-level programming, HPC, Virtual Machines
Tools	Git, Docker, SSH, Cloudflare, Oracle Cloud

Honors & Awards

2024	**Dean's Honor List**, Recognized for high academic performance	*Beirut, Lebanon*
2023	**Dean's Honor List**, Recognized for high academic performance	*Beirut, Lebanon*
2022	**Dean's Honor List**, Recognized for high academic performance	*Beirut, Lebanon*
2022	**Late Henri Qais Naccache Competitive Programming Award**, Competitive programming competition	*Beirut, Lebanon*
2021	**ABLE Hackathon Finalist**, AI for Accessibility Hackathon	*Beirut, Lebanon*