Omar Elsayed

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Research profile

Lossless compression for FPGA accelerators, with a focus on memory and computation for convolutional neural networks (CNNs) and large language models (LLMs). I also study compression and analysis of molecular dynamics trajectories.

Education

McMaster University 2025-present
PhD, Electrical & Computer Engineering

Universiti Teknologi Malaysia 2019-2023
BEng, Electrical & Electronics Engineering

Selected research

HADI Lab, McMaster University | Advised by Dr. Ameer Abdelhadi

Lossless formats and verification. Use shared descriptions of compression formats to build software reference models and verify RTL implementations.

Compressed FPGA memory. Design block RAM layouts for random reads and updates of losslessly compressed data.

Floating-point inference. Study how to store and deliver weights and activations losslessly for matrix multiplication on FPGAs.

Evaluate area, bandwidth, latency, and throughput on FPGA designs.

Technical areas

RTL and verification. SystemVerilog, pipelined datapaths, simulation, and reference models.

FPGA architecture. Intel FPGA block memory, banking, and memory interfaces.

Machine learning hardware. Quantized inference, dot products, GEMV, and lossless compression.