

# Adham Aly

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## EDUCATION

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### University of Toronto

*Honours Bachelor of Science, Computer Science Specialist (AI Focus)*

Toronto, ON

*Sept. 2026 – 2030 (Expected)*

## PROJECTS

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### Character Recognition Neural Network | C++

- Trained a multi-layer perceptron on the MNIST dataset to recognize handwritten digits and letters, implementing the whole network from scratch in C++ with no external libraries and flattening each image into pixel inputs
- Wrote the full training pipeline by hand (the forward pass, the matrix math and activation functions behind it, and the backpropagation and gradient-descent loop that trains it)
- Tuned the network until it reliably recognized handwritten characters it had not seen before

### GPT-Style Transformer Language Model | C++

- Built a GPT-style transformer language model from scratch in C++ with no external libraries, implementing multi-head self-attention, layer normalization, manual backpropagation, and Adam optimization to train a character-level text generator
- Trained the model to predict the next character in a sequence, iterating over a text corpus until its predictions steadily improved
- Generated new text one character at a time, feeding each prediction back in to produce longer passages in the style of the training data

### WMOJ — Competitive Programming Online Judge | TypeScript, Next.js, Docker

- Co-founded WMOJ, an open-source competitive-programming online judge in TypeScript and Next.js, now serving 3+ Halton District School Board schools and powering the WOSS Dual Olympiad
- Engineered a Dockerized judge API that securely compiles and runs untrusted user-submitted code in isolated containers, sandboxing execution and grading submissions against test cases
- Built the full-stack platform (problem library, submission pipeline, and verdict feedback) over a REST API, powering the club's official practice and contest environment

### Scire — Peer-to-Peer Tutoring LMS | Next.js, React, TypeScript

- Built Scire, a full-stack tutoring learning-management system in Next.js, React, and TypeScript, with tutor-tutee matching and scheduling, session tracking, and admin dashboards
- Deployed it into active use at a high-school tutoring club to coordinate and track sessions; currently pursuing Halton District School Board approval to expand district-wide

## EXPERIENCE

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### President, Computer Science Club

*White Oaks Secondary School*

Sept. 2024 – July 2026

*Oakville, ON*

- Directed a 15+ person executive team running computer-science and competitive-programming events, including the WOSS Dual Olympiad, owning logistics, marketing, and sponsorship outreach
- Taught weekly data-structures, algorithms, and software-engineering lessons to a class of 50+ students, building their competitive-programming and problem-solving skills
- Led a 10-person curriculum subteam authoring lesson plans, in-class activities, and original competitive-programming contest problems used across sessions and competitions

## TECHNICAL SKILLS

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**Languages:** C, C++, TypeScript, JavaScript, Python, SQL, x86 Assembly, HTML/CSS

**Frameworks & Libraries:** Next.js, React, Node.js

**Developer Tools:** Docker, Git, Linux, QEMU, GCC, Make/CMake

**Concepts:** Data Structures & Algorithms, Operating Systems, Machine Learning & LLMs, REST APIs, Containerization