Mustafa Tarek Salah Abdelazim

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Education

Bachelor's Degree (BSC) Cairo University, Computer Engineering Sept 2020 – July 2025

CGPA: Very Good **(84%)** Graduation Project: **A+**

High School Degree (HS) Future Experimental Language School Sept 2008 – July 2020

Grade: **98.3%** (Mathematics Section)

Experience

Faculty of Engineering — Cairo University, Teaching Assistant Sept 2025 – Present

- Assisted in teaching and mentoring undergraduate students in the Microprocessors course, by applying embedded systems concepts to microprocessor programming, debugging, and hardware–software integration.
- Assisted in designing and supervising lab sessions and projects involving assembly language, C programming, and interfacing techniques.

Siemens EDA, Digital Twin Training July 2025 – August 2025

- Gained hands-on experience in digital twin development with design integration, and simulation.
- Applied the VSI framework using ROS, FMI, and mechatronics simulators for system modeling and verification.
- Built a Line-Following Robot with PID control using VSI, modeling robot kinematics, simulating disturbances, and evaluating control performance metrics.

Siemens EDA, Software Engineer Intern April 2025 – June 2025

- Working under Siemens' sponsorship as part of my graduation project.
- Developing a Digital Twin to simulate and optimize vehicle acceleration using Model Predictive Control (MPC) and reinforcement learning for fuel efficiency.
- Integrating adaptive algorithms to accommodate diverse driving styles and road conditions.
- Utilizing QEMU, CARLA, and VSI toolchains to develop and test the complete system architecture.

Vodafone, Software Engineer Intern Sept 2024 – Oct 2024

- Scraped and processed Ookla website data for analysis.
- Designed multiple visualizations, including graphs and interactive charts, to illustrate trends and insights effectively.
- Built a website with a Flask-based backend for data handling and a React frontend for user interaction.

Asset-Technology, Software Engineer Intern Aug 2024 – Sept 2024

- Gained experience with OpenText for knowledge management by defining document structures and workflows.
- Contributed to designing a secure platform for streamlined inter-departmental data access.

National Telecommunication Institute (NTI), Artificial Intelligence Training July 2021 – Aug 2021

- Gained proficiency in Python, focusing on applying it for AI projects.
- Acquired foundational knowledge and hands-on skills in machine and deep learning techniques.

Projects

GPU-Accelerated Custom DBMS with CUDA CUDA DBMS

- Designed and implemented a custom DBMS in C++ using object-oriented programming, multithreading, and CUDA to accelerate high-performance query execution. The system processes SQL queries—including selection, projection, joins, filtering, sorting, and aggregation—on large CSV datasets. Focused on parallelizing traditionally sequential database operations using parallel computing techniques to improve execution speed and efficiency.

Smart Order Parser Smart Order Parser

- Developed an NLP system to extract structured information from free-form food order text using trainable word embeddings and a Bi-directional LSTM model. The system accurately identified key entities such as pizza toppings, sizes, crust types, and drink options by understanding the context and sequence of words. The output was a hierarchical parsing tree representing the full order, enabling smooth integration with order management systems.

Fraud Detector Fraud Detector

- Developed a credit card fraud detection system using a highly imbalanced dataset. Applied preprocessing techniques like scaling, outlier removal, feature selection, undersampling, and SMOTE oversampling. Trained and evaluated models including XGBoost, KNN, Logistic Regression, Random Forest, and Decision Tree using ROC-AUC and F1-Score.

Arabic Font Recognition Arabic Font Recognition

- Developed a complete ML pipeline to classify Arabic text images into one of four fonts. The system included preprocessing steps to handle various image variations. Feature extraction was done using Local Phase Quantization (LPQ) to capture texture details. A Support Vector Machine (SVM) model was trained and tuned, with performance compared against KNN, AdaBoost, Decision Tree, and Random Forest classifiers. The final model was deployed on a cloud hosting service for real-time font classification from screenshots.

Grades Autofiller Grades Autofiller

- Developed an automated assistant for TAs and Professors to streamline the grading process by extracting and organizing grades from diverse printed sheets using OCR and features, and automatically correcting multiple-choice bubble sheet exams based on a provided model answer with configurable grading values.

Operating System Scheduler OS Scheduler

- Developed a custom OS scheduler in C on Linux, implementing Round Robin, FIFO, HPF, and SRTN algorithms to manage process execution. Integrated First Fit and Buddy Memory strategies for memory allocation. Used multiprocessing and Linux system calls to ensure efficient CPU and memory utilization.

Twitter Clone Twitter Clone

- Replicates the core features of the social media platform, including authentication, registration, and profile management. It allows users to follow, unfollow, block, and mute others, create and interact with tweets, explore timelines, trends, and hashtags, and exchange direct messages. The system also supports media uploads, notifications, and user search for a complete social experience using Node.js with Express, TypeORM, and PostgreSQL.

Order Management System OMS

- Developed the backend of an e-commerce platform to manage users, products, carts, orders, and discount coupons. Built scalable services using NestJS with a modular architecture for maintainability. Designed and managed relational schemas using Prisma ORM with PostgreSQL. Implemented secure user authentication and profile management, along with RESTful APIs for catalog, cart, order processing, and coupon application.

Vectorized Semantic Search Engine Semantic Search Engine

- Built a scalable semantic search database handling up to 20 million entries using vector embeddings. Used cosine similarity to measure semantic relevance between queries and data points. Implemented an Inverted File Index (IVF) to speed up searches by clustering and limiting search scope. Developed in Python with advanced database indexing techniques. Optimized for fast, accurate retrieval in large-scale datasets.

Skills

Languages: Arabic (Mother Tongue), English (Proficient B2, IELTS Band Score: **6.5**)
Programming Languages: C++, C, Python, Java, JavaScript, SQL, Verilog, VHDL, Assembly8086
Technologies: NodeJS, NestJS, Express, Docker, CMake, Postgres, MongoDB, ORM, Prisma, TensorFlow, PyTorch, Scikit-learn, OpenCV, Pandas, NumPy
Skills: OOP, Data Structures, Algorithms, Machine Learning, Deep Learning, Neural Networks, Computer Vision, Natural Language Processing, Image Processing, Model Deployment, Hyperparameter Tuning, OS Concurrency, Multi-threading

Extracurricular Activities

HR member in IEEE student activity Cairo University - 2021
Organizing sessions and events, interviewing applying participants, and assessing the member's performance in my assigned committee.