

# Ahmed Fathy

Computer Engineer – Embedded Systems

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## EDUCATION

- Cairo University, Faculty of Engineering** Giza, Egypt
  - B.Sc. in Computer Engineering; GPA: 3.6* 2023 – 2027

## EXPERIENCE

- Al Nada Scientific Office** | *Technical Support Trainee* Cairo, Egypt | June 2022 – 2024
  - Diagnostics & Maintenance:** Troubleshoot workstations and network equipment; performed firmware updates and preventive maintenance.
  - Documentation:** Created systematic troubleshooting documentation to streamline hardware issue resolution.

## HARDWARE & EMBEDDED PROJECTS

- x86 Brick Breakers Arcade** | *Assembly (x86), MASM, Low-Level Programming* Source Code | 2024
  - Game Logic:** Developed a real-time, multiplayer arcade game using x86 Assembly and the MASM assembler.
  - System Control:** Directly manipulated video memory for low-latency graphics rendering and managed hardware interrupts to handle real-time I/O.
- 5-Stage Pipelined Processor (RISC)** | *VHDL, QuestaSim, Computer Architecture* Source Code | 2025
  - Core Architecture:** Engineered a **32-bit 5-stage pipelined processor** in VHDL, supporting a custom ISA of over 25 instructions.
  - Hazard Resolution:** Optimized throughput by implementing Hazard Detection and Data Forwarding units to resolve control and data dependencies.
  - Verification:** Validated functional correctness through rigorous simulation and testbench environments in **QuestaSim**.
- Tactic (Robotics & AI)** | *Embedded Systems* Source Code | 2024
  - System Integration:** Developed browser-controlled robotics suite integrating AI computer vision with low-latency hardware control.
  - Firmware:** Programmed ESP32 microcontrollers to handle WebSocket communication for real-time motor control and telemetry.
  - Backend Processing:** Deployed YOLOv5 and OpenCV on host server to process visual feedback and automate robotic decision-making.
- CNN Convolution Accelerator** | *Verilog, OpenLane2, ASIC Design* Source Code | 2025
  - Architecture:** Designed a synthesizable **2D convolution accelerator** using **Systolic Arrays** and fully pipelined dataflow to maximize MAC throughput.
  - Memory Hierarchy:** Implemented DMA-based loading and dual-port SRAM buffering to support up to **16x16 kernel** execution.
  - Physical Design:** Executed RTL-to-GDSII synthesis using **OpenLane2**, validating physical feasibility and achieving timing closure.
- Paint For Kids** | *C++, OOP, Data Structures* Source Code | 2023
  - Application:** Built desktop drawing application with shape tools, color fills, and interactive game modes.
  - Design:** Applied OOP principles using polymorphism for extensible shape classes and Stack-based Undo/Redo system.

## STUDENT ACTIVITIES

- IEEE** | *UI/UX Designer - Frontend Team Leader* Cairo | Oct 2025 – Present
  - Leadership:** Architected intuitive user interfaces and optimized user journey protocols for internal platforms.
- Technical Center for Career Development (TCCD)** | *Frontend Developer* Cairo | June 2025 – Present
  - Development:** Engineered HR dashboard for event tracking and spearheaded optimization of the official TCCD web.
- Physics Helping District (PhD)** | *Team Leader* Cairo | June 2022 – 2024
  - Mentorship:** Led peer tutoring initiative in electronics, achieving measurable academic improvement.

## TECHNICAL SKILLS

- Programming Languages & Systems:** C/C++, Python, x86 Assembly, MIPS Assembly, Bash Scripting, SQL
- Linux Development & Tools:** Linux System Programming (POSIX APIs, System Calls, IPC, Multi-threading), GCC/GDB Toolchain, Make/CMake, Valgrind, Strace, Git/GitHub, Vim, Shell Scripting, Process Management, File I/O
- Cloud & DevOps Fundamentals:** AWS EC2, S3, Lambda (Basic), Docker Containers, CI/CD Pipelines, Linux Server Administration
- Embedded & Digital Design:** ESP32 Microcontrollers, AVR/Arduino, Verilog HDL, VHDL, RTL Design, ModelSim, QuestaSim