

# SALAH-ELDIN HASSEN

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## SUMMARY

Dynamic and adaptable Software Engineer with extensive experience across embedded, digital, and web technologies. Proficient in C/C++ and Python, I excel at leveraging advanced AI tools to transform innovative ideas into robust, production-ready solutions. A fast learner and effective collaborator, I bring a creative, forward-thinking approach to solving complex technical challenges.

## EDUCATION

- **Cairo University Faculty of Engineering, Department of Electronics and Electrical Communication Engineering (CUFE EECE), Maintaining a (Very Good) degree // 2021 - 2026.**

## WORK EXPERIENCE

- **Robotics & Embedded Instructor // Beta Academy // Seasonal // Jan 2023 - Present.**
  - Promoted from Technical Support to Lead Instructor for Arduino and AVR embedded systems, instructing 600+ students in programming and hardware integration with consistently positive feedback.
- **Coding AI Trainer // Outlier // Freelancing // Nov 2024 - Dec 2024.**
  - Trained and optimized AI models for coding tasks through iterative evaluation, scenario-based testing, and targeted training frameworks to enhance code generation accuracy and algorithmic proficiency.
- **Data Entry Clerk // Covo Connect // Full time // Jun 2023 - Jul 2023.**
  - Entering banking data from photos to text, improving touch-typing skills.

## SKILLS

- **Embedded:** Atmega16/32 (AVR) - PIC18F2XK20/4XK20 (PIC) - STM32 - ARM Cortex-M - Embedded C - FreeRTOS - I2C - USART - SPI - SOMEIP.
- **Software:** C / C++ - OOP - MATLAB - Assembly - Rust - Data Structures - Algorithms - Python - Automation - Scripting - Kali Nethunter - Ubuntu - Debian - AI tools - Qt - Git & Git-Hub - Latex.
- **Digital:** HDL languages (VHDL, Verilog, System Verilog) - FPGA Xilinx - Linting.
- **Web:** HTML5 - CSS3 - JavaScript - Bootstrap - jQuery - Laravel - SQL.
- **Tools:** Visual Studio - Eclipse - Cube IDE - MPLAB Code Configurator - MATLAB - Proteus - Cadence - Multisim - Questa/Modelsim - Vivado - Arduino IDE - QT Creator - DataGrip - Altium.

## PROJECTS

- **FreeRTOS-Based Dual Microcontroller Door Security System**
  - Developed a door security system using two microcontrollers with FreeRTOS for efficient task management, Implemented password authentication, I2C-based EEPROM storage, and automated door mechanisms to enhance access control. Integrated PIR sensors for motion detection and an H-bridge for motor control.
  - **Key Elements:** ATmega32, I2C, USART, EEPROM, FreeRTOS, Semaphores, Queue, PIR sensor, H-bridge.
- **Advanced Digital Multimeter on PCB**
  - Developed a digital multimeter capable of measuring voltage (-200V to 200V), current (0.5mA to 2A), and resistance (0Ω to 5MΩ). Designed the circuit from scratch and implemented it on a custom PCB. Integrated an LCD and keypad for user input, with ADC, relays, MUX, and DEMUX for signal processing.
  - **Key Elements:** ATmega32, PCB, GPIO, LCD, Keypad, ADC, Relays, MUX, DEMUX.
- **I2C-Integrated Control Unit**
  - Designed a control unit to monitor temperature and control a motor using multiple I2C devices, including a temperature sensor, RTC, external EEPROM, and a slave MCU. Developed firmware using MCC for seamless I2C communication.
  - **Key Elements:** PIC18F46K20, MCC (MPLAB Code Configurator), I2C, USART, RTC, EEPROM.
- **Concurrent Rust TCP Server with Test Suite Optimization**
  - Designed a multithreaded Rust TCP server with Protocol Buffers and optimized test suite for port conflict resolution.
  - **Key Elements:** Rust, Multithreading, Protocol Buffers, Thread Safety, Non-blocking I/O.
- **Advanced Tic Tac Toe Game**
  - Designed a C++ Tic Tac Toe game with AI (minimax), user authentication, and an interactive Qt-based GUI.
  - **Key Elements:** C++, Minimax Algorithm, Secure Hashing, Qt, SQLite, Git, GitHub Actions.
- **Advanced Image Editor with Qt and OpenCV**
  - Developed a Qt-based C++ image editor with OpenCV, featuring cropping, resizing, filters, and real-time editing.
  - **Key Elements:** C++, OpenCV, Qt.

- **SPI Slave Interface**
    - Developed an SPI Slave Interface with optimized FSM and debug core integration, including simulation and constraints.
    - **Key Elements:** Verilog, SPI, FSM Design, Simulation, Linting.
  - **Spartan-6 DSP48A1**
    - Designed and tested a DSP48A1 digital signal processing block in Verilog with C++ test benches and simulations.
    - **Key Elements:** Verilog, DSP48A1, C++ Simulation, Test Benches, Linting.
  - **Laravel Workshops System**
    - Built a Laravel system for workshop scheduling, participant management, and attendance tracking.
    - **Key Elements:** Laravel, PHP, MySQL, Bootstrap, Git.
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## OTHER PROJECTS

- Multi-CV Generator Script - Automated Multi-CV generation using Python for ATS-friendly resume formatting.
  - Simulation & Linting Scripts - Developed Python and batch scripts for running ModelSim simulations, waveform viewing (GTKWave), and linting Verilog files using Qverify.
  - Maze-Solving Line-Follower Robot Car - Arduino-based pathfinding robot.
  - SFML Chess Game - C++ chess game with an interactive GUI.
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## COURSES

- **Advanced Embedded Diploma // Eng: Ahmed Abdel-Gafar // Dec 2024 - Current.**
    - Comprehensive training on ARM Cortex-M4 architecture, debugging, and memory systems.
    - Embedded systems development covering compilation process, linker script, and startup code.
    - Device driver development for GPIO, RCC, SysTick Timer, Flash Memory Interface, and NVIC.
    - Bootloader design, implementation, and testing for embedded applications.
    - Automotive communication protocols including LIN and CAN.
    - Introduction to AUTOSAR fundamentals, layered architecture, and modular programming.
    - Compliance with MISRA C standards for secure and reliable embedded development.
  - **Embedded PIC Diploma // Eng: Ahmed Abdel-Gafar // Jul 2024 - Sep 2024.**
    - Fundamentals of embedded systems, C programming, and embedded development tools.
    - PIC microcontroller interfacing with full driver implementation using Embedded C.
    - Communication protocols including USART, SPI, and I2C.
  - **Embedded AVR Diploma // Eng: Mohammed Tarek // Jun 2024 - Oct 2024.**
    - Fundamentals of embedded systems, C programming, and real-time operating systems (RTOS).
    - Data structures including linked lists, stacks, and queues, along with software engineering principles.
    - AVR microcontroller interfacing with full driver implementation using Embedded C.
    - Hands-on hardware labs for practical embedded systems development.
  - **SOME/IP Workshop // BULLET - Eng/Hazem // OCT 2024 - OCT 2024.**
    - Practical workshop on SOME/IP protocol and client-server communication.
    - Focused on service-oriented middleware for automotive and IoT applications.
  - **Linux Fundamentals // IEEE ASU // Aug 2024 - Sep 2024.**
    - Covered Linux file management, shell scripting, and system operations.
    - Learned networking, SSH, and web server setup.
  - **Digital Design Diploma // Eng: Kareem Waseem // Jan 2025 - Mar 2025.**
    - Studied Digital/RTL Design with Verilog and FPGA design flow.
    - Covered STA, CDC techniques, low-power design concepts, and Questa Lint-based analysis.
  - **Digital Verification Course // IEEE CUFE // Mar 2025 - Current.**
    - Training in UVM-based verification, functional coverage, and SystemVerilog assertions.
    - Working with QuestaSim, formal verification, and FPGA debugging techniques.
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- **Competitions & Activities:** First place in Robotics Competition (2022), ECPC Contestant (2022, 2023), NASA Hackathon participant.