SALAH-ELDIN HASSEN

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EDUCATION

- **Cairo University Faculty of Engineering, Department of Electronics and Electrical Communication Engineering (CUFE EECE).**

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.

SKILLS

- **Software:** C / C++ - OOP - MATLAB - Assembly - Rust - Data Structures - Algorithms - Python - Automation - Scripting - Linux - Fedora - Kali Nethunter - AI tools - Qt - Git & Git-Hub - Latex.
- **Embedded:** Atmega16/32 (AVR) - PIC18F2XK20/4XK20 (PIC) - STM32 - ARM Cortex-M - Embedded C - FreeRTOS - I2C - USART - SPI - SOMEIP.
- **Digital:** HDL languages (VHDL, Verilog, System Verilog) - TCL - FPGA Xilnix - 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

- **Concurrent Rust TCP Server with Test Suite Optimization**
  • Developed a multithreaded TCP server in Rust, transitioning from a buggy single-threaded implementation. Improved client handling using Protocol Buffers for structured communication. Optimized the test suite by resolving port conflicts through port isolation and serial execution strategies.
  • **Key Elements:** Rust, Multithreading, Protocol Buffers, Thread Safety, Non-blocking I/O.
- **Advanced Tic Tac Toe Game**
  • Developed a C++ Tic Tac Toe game featuring user authentication, personalized game history, and AI-driven gameplay using the minimax algorithm. Implemented an interactive GUI with Qt, secure user management with hashing, and performance optimizations. Automated testing was conducted using Qt Test on Github Actions.
  • **Key Elements:** C++, Minimax Algorithm, Secure Hashing, Qt, Qt Test, SQLite, Git, GitHub Actions.
- **Advanced Image Editor with Qt and OpenCV**
  • Built a C++ image editor using Qt and OpenCV, supporting cropping, resizing, and various filters (blur, grayscale, sharpen). Designed a dark mode UI with drag-and-drop image loading and real-time editing capabilities.
  • **Key Elements:** C++, OpenCV, Qt.
- **FreeRTOS-Based Dual Microcontroller Door Security System**
  • Designed a dual-microcontroller-based door security system with FreeRTOS, password authentication, and automated mechanisms. Utilized I2C EEPROM storage and motion detection for enhanced access control.
  • **Key Elements:** ATMega32, I2C, USART, EEPROM, FreeRTOS, PIR sensor, H-bridge.
- **Advanced Digital Multimeter on PCB**
  • Designed a PCB-based multimeter to measure voltage, current, and resistance, integrating an LCD, keypad, and ADC for signal processing.
  • **Key Elements:** ATMega32, PCB, GPIO, LCD, Keypad, ADC, Relays, MUX, DEMUX.
- **I2C-Integrated Control Unit**
  • Developed an I2C-based control unit for temperature monitoring and motor control, integrating RTC, EEPROM, and a slave MCU.
  • **Key Elements:** PIC18F46K20, I2C, USART, RTC, EEPROM.
- **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.

OTHER PROJECTS

- Multi-CV Generator Script - Automated Multi-CV generation using Python for ATS-friendly resume formatting.
- Simulation & Linting Scripts - Developed Python and batch sc,ripts 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.

COURSES

- **SOME/IP Workshop // BULLET - Eng/Hazem // OCT 2024 - OCT 2024.**
  • Hands-on experience with the SOME/IP protocol through a practical workshop.
  • Implemented sample client-server communication for networked embedded systems.
  • Explored service-oriented middleware for automotive and IoT applications.
- **Linux Fundamentals // IEEE ASU // Aug 2024 - Sep 2024.**
  • Learned Linux file management, shell scripting, and user permissions.
  • Gained skills in process control, package handling, and filesystem management.
  • Developed expertise in Linux networking, SSH, and web server setup.
- **Advanced Embedded Diploma // Eng: Ahmed Abdel-Gafar // Dec 2024 - Current.**
  • Comprehensive training on ARM Cortex-M4, embedded development, and device drivers.
  • Bootloader implementation, automotive protocols (LIN, CAN), and AUTOSAR fundamentals.
  • MISRA C compliance for secure embedded software development.
- **Embedded PIC Diploma // Eng: Ahmed Abdel-Gafar // Jul 2024 - Sep 2024.**
  • Training on embedded systems, PIC microcontrollers, and Embedded C.
  • Implemented drivers and worked with USART, SPI, and I2C protocols.
- **Embedded AVR Diploma // Eng: Mohammed Tarek // Jun 2024 - Oct 2024.**
  • Training on embedded systems, RTOS, and AVR microcontroller interfacing.
  • Implemented drivers, worked with Embedded C, and practiced data structures.
- **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.

- **Competitions & Activities:** First place in Robotics Competition (2022), ECPC Contestant (2022, 2023), NASA Hackathon participant.