# SHAHD GAMAL MAHMOUD

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## **EDUCATION**

## Cairo University Faculty of Engineering (CUFE)

2021 - 2026

- Bachelor of Electronics and Electrical Communications Engineering (EECE).
- Maintained a GPA of 3.3 (Very Good).
- Related Courses: Logic Design, Microprocessors, Analog IC Design I&II, Embedded Systems, Data Structure.

## **SKILLS**

**Software:** C/C++ - OOP - MATLAB - Assembly - Data Structures - Algorithms - Qt - Git & GitHub - AI tools.

Embedded: Atmega16/32 (AVR) - Embedded C - FreeRTOS - I2C - USART - SPI.

**Digital:** HDL languages (VHDL, Verilog, System Verilog) - TCL - FPGA Xilinx - Linting.

**OS:** Linux - Windows.

# **PROJECTS**

## Student Management System | Link

Summer 2024

- Built a CLI-based student DB with CRUD operations, GPA calc, and memory safety.
- Used linked lists and structs to efficiently manage dynamic data.
- Technologies: C Linked Lists Structs Pointers File I/O.

## Advanced Tic Tac Toe Game | Link

Spring 2024

- Developed a C++ Tic Tac Toe game with AI using minimax, user authentication, and GUI.
- Integrated secure hashing and tested with Qt Test for reliability.
- Technologies: C++ Minimax Algorithm Secure Hashing Qt Qt Test SQLite Git GitHub Actions.

## Reverse Tic-Tac-Toe AI Development | Link

Fall 2023

- Designed an AI for Reverse Tic-Tac-Toe using Minimax with Alpha-Beta Pruning.
- Built a web-based simulation with advanced heuristics and multi-tape Turing strategies.
- Technologies: C++ Minimax Alpha-Beta Pruning Linear Algebra Decision Trees Web Development.

## Self-Driving Robots - Path Planning & Obstacle Avoidance

Spring 2023

- Developed an autonomous robot navigation system using Fast-Marching Method 2 (FMM2).
- Compared FMM2 with A\* algorithm, achieving smoother paths in MATLAB simulations.
- Technologies: MATLAB FMM2 A\* Algorithm Path Planning.

#### Dual Microcontroller Door Locker System | Link

Summer 2024

- Designed a dual-microcontroller door lock system with password auth and EEPROM data logging.
- Included PIR-based motion sensing and H-Bridge controlled door actuation.
- Technologies: ATMega32 I2C USART EEPROM PIR H-Bridge.

## **Smart Home Automation | Link**

Summer 2024

- Built a smart home system for automated lighting and fan control based on temperature and light intensity.
- Integrated fire detection with alerts and real-time LCD status display.
- Technologies: ATMega32 LCD LM35 LDR Flame Sensor PWM Buzzer GPIO ADC Timer.

#### Real-Time Operating System (RTOS) Project

Spring 2024

- Implemented a FreeRTOS-based system with task scheduling, semaphores, and queue management.
- Ensured efficient task prioritization using preemption and time slicing.
- Technologies: FreeRTOS C Programming Semaphores Timers Dynamic Memory Allocation.

## SPI Slave with Single-Port RAM | Link

Spring 2025

- Designed SPI slave with FSM and RAM in Verilog, verified via testbench in QuestaSim.
- Compared FSM encodings (Gray, One-Hot, Seq) to optimize timing and resource use.
- Technologies: Verilog SPI FSM QuestaSim Vivado QuestaLint FPGA.

- Implemented a DSP slice with registers and multiplexers for arithmetic operations.
- Verified RTL design using QuestaSim and performed synthesis in Vivado.
- Technologies: Verilog QuestaSim QuestaLint Vivado FPGA.

### Maze-Solving Line-Follower Robot Car

Summer 2022

- Built an autonomous robot car for maze navigation with path memory and Bluetooth control.
- Used IR sensors for line following and DC motors for movement.
- Technologies: Arduino DC Motors H-Bridge Bluetooth Module IR Sensors.

## **OTHER PROJECTS**

- MATLAB Signal Processing and Simulink Control System Projects.
- Analog IC Design Projects on Cadence.
- Advanced Digital Multimeter on PCB | Link
- CMOS Analog Circuit Design
- Stopwatch with Dual Mode | Link
- Car Parking Sensor | Link

#### **COURSES**

### Embedded AVR Diploma | Eng: Mohammed Tarek | Certificate

Jun 2024 - Oct 2024

- Basic Concepts of Embedded Systems C Programming Embedded Tools Real Time OS(RTOS).
- Data Structures (Linked-List, Stack and Queue) Software Engineering HW Labs.
- AVR Micro-controllers Interfacing (Implement all the drivers) C For Embedded Applications (Embedded C).

## Robotics Workshop | Beta Academy

Jul 2022 - Sep 2022

- Arduino board Basic Concepts of Embedded Systems Basics of C Programming.
- HW components: LED, Resistor, Breadboard, potentiometer, sensors, 7-segment display, Motors, H-bridge.

#### Digital Design Diploma | Eng: Kareem Waseem | Certificate

Jan 2025 - Mar 2025

- RTL Design & FPGA Flow Verilog, synthesis, timing analysis, and optimization.
- FPGA Prototyping Vivado flow, constraints, IP integration, and validation.
- Advanced Design CDC, low-power, and protocol implementation.

## Digital Verification Workshop | IEEE CUSB

Apr 2025 - Current

- Verification Flow SystemVerilog (SV) Basics OOP & Constrained Randomization.
- Functional & Code Coverage Assertions SV Interfaces UVM Fundamentals.
- Testbench Development Stimulus Generation Checkers & Subscribers.

## FPGA Workshop | IEEE ASUSB

Aug 2024 - Sep 2024

- SoC Design FPGA Basics Scripting Skills (TCL).
- Optimization Techniques (Area, timing, and power) CDC Techniques.

# Solar PV Training | ECOEGY

Jul 2023 - Aug 2023

- Engineering design and shop drawings, Solar project development and calculations.
- Project management for grid-connected stations, Field installations experience.