Marwan Amgad Abdelfattah

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Education

The German University in Cairo

B.Sc Computer Science and Engineering Bachelor Thesis & Project Grade: A+

Experience

Nokia Software Engineer - Intern Capital Guard Embedded Software Engineer - Intern The German University in Cairo CS Junior Teaching Assistant Publications October 2020 - (Expected) June 2025 New Cairo, Egypt

September 2023 - October 2023

July 2023 - September 2023

February 2022 - June 2022

February 2024 - June 2024

October 2023 - March 2024

M. A. Abdelfattah, H. O. Ahmed and M. A. Abdelghany, "16-Bit SABP: Quasi-Stochastic Data Representation Unit for AI Hardware Using FPGA," 2024 IEEE 37th International System-on-Chip Conference (SOCC), Dresden, Germany, 2024, pp. 1-6, doi: 10.1109/SOCC62300.2024.10737766. Projects

16-Bit SABP: Quasi-Stochastic Data Representation Unit for AI Hardware

- Designed and implemented a **16-bit Shifted Asserted Bent-Pyramid (SABP)** for AI hardware on **Intel Cyclone V FPGA** using **VHDL**.
- Improved data accuracy (8.2% max error) and computational efficiency, achieving 969.93 MHz with 7.02 mW power consumption.
- Optimized **stochastic computing** for AI acceleration, outperforming 10-bit BP and 16-bit SC in speed and accuracy.

Embedded Systems Implementations

- Gesture-Controlled Car Crane system: Developed a gesture and joystick-controlled car with a crane arm for remote precision tasks.
 - Integrated wireless communication for real-time operation using Raspberry Pi Pico and Arduino RP2040.
- **Stop-Watch:** Developing a system that control the stop-watch time and display it on 7-segments. Drivers: GPIO, Timer, External Interrupts and 7-Segement Microcontroller: ATmega32.
- Fan Speed Controller with Temperature: Developing a system that controls the speed of a fan depending on the temperature.

Drivers: GPIO, ADC, PWM, LM35 Sensor, LCD and DC-Motor - Microcontroller: ATmega32.

- **Distance Measuring System:** Developing a system that measure the distance and display it on LCD. Drivers: GPIO, ICU, Ultrasonic Sensor and LCD Microcontroller: ATmega32.
- Door Locker Security System: Developing a system to unlock a door using a password. Drivers: GPIO, Keypad, LCD, Timer, UART, I2C, EEPROM, Buzzer and DC-Motor - Microcontroller: ATmega32.

Smart Car

- October 2023 January 2024
- A smart self-driving car that follows a straight lane and whenever it goes out of the lane a warning message is displayed on the 7-segment display. The car also stops when it detects an obstacle in front of it (Done by: VHDL).

Banque Misr Hardware System Security (Capital Guard)

July 2023 - September 2023

February 2023 - June 2023

- Embedded Systems: Developed firmware in C for Kantech access control panels.
- Software Integration: Managed data processing, access control, and device communication.
- Hardware Interaction: Enabled seamless operation with card readers, locks, and sensors.

Operating System Simulation

• Built an interpreter, process scheduler, and memory manager with mutex-based synchronization.

Programming Languages: Java, Python, C#, JavaScript, Prolog, Haskell Embedded Framework: C, C++, Embedded C, Arduino C Hardware Design Framework: VHDL Framework: NextJs, NodeJs, ReactJs, ASP.NET Databases: PostgreSQL, MongoDB, MS SQL Server Developer Tools: Docker, Git,Docker, Git, Github Actions Machine Learning:Tensorflow, Sickit-learn, OpenCV, Pandas Numpy Languages: Arabic (Native), English (Fluent), German (Intermediate)

Courses

Embedded Automotive and AUTOSAR Device Drivers

AUTOSAR Layered Architecture, AUTOSAR Drive Dirvers, AUTOSAR Layered Architecture, AUTOSAR Drive Dirvers, AUTOSAR and C Misra Rules, AUTOMOTIVE Buses Lin and Can, Implement Dio and Port AUTOSAR Driver for TM4C Micro-controllers, Final project to apply the full layered architecture model.

RTOS for Embedded Sytsems

Covered system design using RTOS, FreeRTOS features, RTOS runtime analysis, OSEK and AUTOSAR OSx and a Final Project of Implementing a Seat Heater Control System using FreeRTOS and Tiva C.

ARM Architecture based on TM4C Micro-controllers

ARM Cortex-M Architecture and Programming Model, TM4C Micro-controller GPIO Driver, ARM CortexM3/M4 SysTick Timer Driver, ARM CortexM3/M4 NVIC System, TM4C Micro-controller Edge Triggered Interrupts, ARM CortexM3/M4 System Exceptions: PendSV, SVC and SysTick Exceptions, ARM CortexM3/M4 Fault Exceptions: HardFault, UsageFault, BusFault and MemoryManagement Fault, ARM CortexM3/M4 MPU Driver, TM4C Micro-controller PLL Driver.