



Abdelrahman Fouda

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ABOUT ME

I am Abdelrahman Fouda, a senior nanotechnology and nanoelectronics engineer specializing in VLSI with a keen interest in Digital and Analog design, RISC-V, ASIC and FPGA, Nanoelectronics, Fabrication and Verification, Embedded systems and Robotics, Telecommunication, Optical communication, Integrated silicon photonics. I possess a strong understanding of these fields and have developed advanced practical and software skills. Currently, I'm working on "RISC-V Integration and ISA Extension for Efficient MSM on BLS12-377 and BLS12-381 Curves" as my graduation project.

WORK EXPERIENCE

Robotics and Tiny Machine Learning Engineering trainee

Zewail City of Science and Technology [01/07/2024 – 19/10/2024]

City: 6th October | Country: Egypt | Business or sector: Information and communication

- Designed and built an obstacle avoidance robot using Raspberry Pi Pico and radar sensors.
- Trained and deployed a quantized TensorFlow Lite model, achieving 83.9% accuracy on hardware.
- Transitioned Python-based models into C arrays for embedded system deployment.
- Utilized Q-learning for data collection and neural network training.
- Validated robot performance through real-world testing and simulation.

EDUCATION AND TRAINING

B.S.C., Nanotechnology and Nanoelectronics Engineering

University of Science and Technology in Zewail City [01/10/2020 – Current]

City: Giza | Country: Egypt | Website: <https://zewailcity.edu.eg/> | Field(s) of study: Nanotechnology and Nanoelectronics Engineering: • Electronics and automation | Final grade: 3.0109 | Level in EQF: EQF level 7 | Thesis: RISC-V Integration and ISA Extension for Efficient MSM on BLS12-377 and BLS12-381 Curves

Relevant Courses: Digital Logic Design, Electric Circuits, Electronic Circuit Design, Solid State Devices, Physics of semiconductors, Advanced devices, C/C++ Programming Lab, Analog Integrated Circuit Design, Computer Architecture & Assembly Language, ASIC and FPGA Design, Real-Time Embedded System, Advanced Digital ASIC Design, Applied digital control, Nanofabrication Vacuum & Equipment Tech, Advanced RF/Mixed Signal ICs and Testing, Verification and Reliability.

Software: ModelSim, Cadence, Silvaco, CleWin, Proteus, Ansys, Autodesk Fusion, AutoCAD, COMSOL, Lumerical.

Programming Languages: Python, C, C++, MATLAB, Assembly.

HDLs: Verilog, SystemVerilog.

Cleanroom: Photolithography, Thermal Oxidation.

Characterization Techniques: XRD, AFM, TEM, FTIR.

ACADEMIC PROJECTS

ASIC and FPGA Flow Comparison Project (Fall 2024)

Implemented an RTL design using ASIC and FPGA flows. Evaluated performance metrics including frequency, power, chip area, and utilization. Used NangateOpenCell Library PDK (45 nm) for ASIC and Spartan 6 kit for FPGA, ensuring no timing violations. Compared design performance between ASIC and FPGA and documented the results with detailed descriptions of the flows (DC + ICC, PT).

Self-Balancing Robot

In this project, the robot utilizes sensor data from an accelerometer and a gyroscope to determine its precise position in three-dimensional space. These values are transmitted to a microcontroller, which processes the information using pre-programmed algorithms. Based on the calculations, the microcontroller provides appropriate instructions to the motor driver module, which adjusts the rotation of the wheels, enabling the robot to maintain balance effectively.

Design of a 32×12-bit 6T SRAM Using 65nm (Cadence)

Designed and analyzed a 32×12-bit SRAM with a focus on schematic, layout, and test benches. Calculated delay and power consumption during read/write operations and proposed design improvements to optimize the figure of merit.

FM Communication System

Collaborated in a team of two to design and implement an FM communication system using MATLAB and LabVIEW.

CMOS Transistor Fabrication Design

Designed a 250 nm CMOS transistor fabrication process in a team, determining technology parameters and performing semiconductor processing calculations (oxidation, photolithography, deposition, etching, ion implantation). Simulated and implemented the design using the TCAD simulator (SILVACO).

Photonic Crystal Fiber Simulation

Designed the structure of a photonic crystal fiber, performed simulations, and analyzed the results.

Automated Teller Machine (ATM) System Implementation

Implemented an ATM system using Object-Oriented Programming (OOP) in C++ as part of a team.

Internet Phone Filter Splitter

Designed and implemented a passive circuit for splitting phone line signals into voice and data. Conducted simulations in Proteus, built hardware on a breadboard, and designed the PCB using EasyEDA.

4-bit ALU Design and Implementation

Designed a 4-bit Arithmetic Logic Unit (ALU) capable of operations like addition, subtraction, multiplication, increment, right shift, and bitwise OR, NAND, and XOR. Tasks included circuit design, PCB design (EasyEDA), breadboard implementation with ICs, and circuit verification using SystemVerilog.

Audio Amplifier Circuit Design

Designed and implemented an audio amplifier circuit using Bipolar Junction Transistors (BJTs).

Two-Stage CMOS Operational Amplifier Design

Designed a two-stage CMOS operational amplifier using Cadence with 65 nm technology.

SAP1 Architecture Implementation

Designed and implemented SAP1 architecture using Logisim software, followed by hardware implementation.

XO Game Using Assembly

Developed a functional XO game using assembly language.

Security System Development

Collaborated to develop a security system utilizing motion and sound sensors. Integrated the system with the Tiva C Series microcontroller platform using FreeRTOS.

LANGUAGE SKILLS

Mother tongue(s): Arabic

Other language(s):

English

LISTENING B2 READING C1 WRITING B2

SPOKEN PRODUCTION B2 SPOKEN INTERACTION B2

DIGITAL SKILLS

Electronics

■ IC Mask Design : Cadence Virtuoso Product Suite / Photonic simulators including Lumerical FDTD / Xilinx Vivado/ Vitis / COMSOL / Verilog-HDL & VHDL / Silvaco Tcad / Synopsys XA / Ansys / FPGA based Digital Design/Development and Testing

Programming Languages

Matlab/Simulink / Python / C / C++ / C+

3D Design

CAD Software (SolidWorks, AutoCAD, Fusion360)