Muhammad Ali Nanoelectronics

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Education

1- Erasmus Mundus Joint Master's Degree in Microelectronics, Photonics, and Radiation Effects (EMJMD RADMEP)

1- Katholieke Universiteit Leuven (KU Leuven), Belgium
2- University of Jyväskylä (JYU), Finland
3- University of Montpellier (UM), France
4- University Jean Monnet (UJM), France

- Specialization: Microelectronics
- Aug-2023 - Sep-2025

2- Bachelor of Science in Electrical and Electronics Engineering

- Pakistan Institute of Engineering and Applied Sciences (PIEAS)
- Sep 2018 - June 2022
- Specialization: Electronics.
- Graduation with 2nd distinction
- CGPA: 3.74 / 4.00

Professional Experience

1- imec, Leuven, Belgium

- Title: 3D SRAM Macro Design in 3D Nanofabric Process Technology
- Type: Full-time Visiting Scholar
- Date: Jun 2024 – Aug 2024
- First part of a two-phase Visiting Scholar program. Developed a 3D SRAM macro using innovative 3D Nanofabric Process Technology, which allows the printing of 3D structures in a single process, reducing wafer footprint and improving performance (less delay).

2- LIRMM Lab, University of Montpellier, France

- Title: 3D SRAM Macro Design in 3D Nanofabric Process Technology
- Type: Part-time Visiting Scholar
- Date: Oct 2024 – Jan 2025
- Second part of a two-phase Visiting Scholar program. Transferred knowledge from imec to LIRMM and supported a PhD student in applying 3D nanofabric technology for SRAM design.

3. CERN, Switzerland

- Title: Radiation effects on electronic devices
- Type: Full-Time (Short-Term)
- Date: Dec 9 – 15, 2024
- An intensive one-week program, where I will work on radiation effects on electronic devices.

4. Huawei, Islamabad, Pakistan

- Title: Cloud Core Network Engineer
- Type: Full-Time
- Date: Aug 2022 – Jul 2023.
- Group Leader: Oct 2022 – Jul 2023
- Involved in core network deployment projects, including 5G Core, Cloud Edge, and network function virtualization using FusionSphere OpenStack.

5. National Institute of Electronics, Islamabad, Pakistan

- Type: Full-Time (Internship)
- Date: Aug 2021 – Sep 2021
- Designed and developed a two-wheel self-balancing robot.

Research Experience

1- 3D SRAM Macro Design in 3D Nanofabric Process Technology

2- CMOS image sensor

Under the guidance of Prof Guy Meynants at KU Leuven, the prominent scientist behind the image sensors used in the Mars Perseverance rover's navigation and hazard detection systems, I worked on a CMOS image sensor and its integration into image processing systems.

3- SAR ADC

Using Cadence, I designed a SAR ADC with TSPC logic, addressing challenges like charge injection and clock feedthrough, and achieving precise binary search through a refined transistor-based implementation of the DAC, comparator, and SAR logic.

4- Single Event Effects (SEEs) in FPGA

I analyzed SEEs, specifically Single Event Latch-up (SEL), in a 16nm FinFET System-on-Chip (SoC). Using advanced laser testing, and emission microscopy, I mapped SEL-sensitive areas in FPGAs, such as IO banks and mixed-signal circuits, and studied the impact of thermal and voltage variations on SEL thresholds.

5- TID effects on Flash Memory IC

I studied X-ray radiation effects on flash memory IC, observing data corruption after prolonged exposure, with '0' bits flipping to '1' and control logic damage affecting erase and write functions. Partial recovery of erase functionality indicated transient fault self-correction.

Awards

- European Erasmus Mundus Scholarship (2023-2025)
- Bachelor's graduation with 2nd distinction (2022)
- 2nd place in Huawei's Global Service Center Skill Contest for Cloud Core (2022)
- Huawei's Medals: ▪ Master Examinee ▪ Searcher ▪ Perseverer ▪ Diligent Learner

Projects

1- FPGA-based TCP Firewall on Zynq and MicroBlaze with Mailbox and BRAM communication, and DDR Storage
2- 3D orientation virtualization using Accelerometer and Gyroscope
3- Industrial digital testing of IC (universal shift register) on Verigy V93K ATE
4- Designed a 1kVA UPS powered by a single-phase 220V/50Hz AC.
5- Design of Filters to Remove Cross-Over Distortion in Class B Amplifiers, Minimize Tape Recorder Noise, and Stabilize Car Alternator Output
6- Detection of cracks in Ceramic Tiles using Digital Image Processing
7- Image sensor characterization/measurements, and defect assessment
8- 35% Duty Cycle Rectangular Waveform using Astable Multivibrator (555 Timer)
9- Elemental and Depth Profiling in multilayer thin films using Time of Flight - Elastic Recoil Detection Analysis (ToF-ERDA)
10- Nanoscale Analysis of multilayer thin films using Helium Ion Microscopy (HIM)
11- Implementation of deep learning control for a Quadcopter
12- Designed and implemented a stepper motor controller for a 3D printer
13- Temperature Measurement and Calibration using PT100
14- RIAA Amplifier
15- Maze Solver Robot
16- Line follower robot
17- FPGA-based pong game (VHDL and C (microblaze))
18- Android P2P messaging App
19- Controlling Servo from Web browser wirelessly using ESP32
20- Controlling Servo using Potentiometer and ESP32
21- Parallelization in Distributed Memory Machines
22- Parallelization in Shared memory Machines
23- 15,000 mAh Laptop Power Bank
24- Color Filter Array (CFA) reconstruction, and Spatial Filtering
25- Trained Reinforcement Learning agent for autonomous driving
26- Reinforcement Learning for Atari Breakout Game
27- Trained Neural Network for Image prediction
28- Training CartPole to balance itself
29- Tic-tac-toe game using a C++

Leadership/ Volunteer

- Vice-president IEEE PIEAS Student Branch *Sep-2021 – May-2022*
- Head videography at IEEE's ISYWSC event *Oct 2021 – Dec 2021*

- Head Design Team at PIEAS Literary Society *Jan 2021 – May 2021*
- Head Videography at charity organization Muaawin *Jan 2021 – Jun 2021*
- Co-director Videography PIEAS Media Club *Nov 2020 – Apr 2021*
- Inquiry Team Member at charity organization Muaawin Rozgaar *Dec 2020 – July 2021*
- Head videography PIEAS National Olympiad *Dec 2021 – Jan 2022*
- Organizing member at International Workshop on 2D and Quantum Effect Devices *Nov 2018 – Nov 2018*

Skills

- **IDEs**: Cadence Virtuoso, Spectre & Innovus, Xilinx Vivado, MATLAB, LabVIEW, TCAD, Keil, ModelSim, LTspice
- **Programming Languages**: VHDL, Python, C++, Embedded C
- **Languages**: English, French (Beginner), Pushto, Urdu, Punjabi, Hindi
- **Soft Skills**: Quick Learning Ability, Adaptability, Teamwork, Leadership, Responsibility, Time management

References

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