

Nezam Rohbani

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OBJECTIVES AND MAJOR INTERESTS

SRAM and DRAM Memory Design, Processing-in-Memory, Neural Networks Accelerators, Fault Management in Neural Networks, Non-Volatile Memories, Aging-Aware Processor Architecture Design, Thermal and Power Management, Aging and Process Variation Sensors

EDUCATION

2018 – Now

- Researcher at School of Computer Science, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran. Main research fields: Processing-in-memory, DRAM and SRAM architecture design, power and energy management, aging sensors

2017 – 2017

- Visiting researcher at HiSIM Research Center, Hiroshima University, Hiroshima, Japan. Research topics: Cache memory aging management, aging model evaluation
Supervisor: Dr. Mitiko Miura-Mattausch, Dr. Hans Jürgen Mattausch

2012 – 2018

- Ph.D. student in computer engineering, Sharif University of Technology, Tehran, Iran. Thesis: “Reliability Improvement in Aging-Sensitive Units of a Processor”
Supervisor: Dr. Seyed-Ghassem Miremadi, Dr. Alireza Ejlali

2010 – 2012

- M.Sc. student in computer engineering, Sharif University of Technology, Tehran, Iran. Final Project: “Energy Management in Energy Harvesting Wireless Sensor Nodes”
Supervisor: Dr. Alireza Ejlali

2004 – 2010

- B.Sc. in computer engineering, Babol Noshirvani University of Technology, Babol, Iran. Final Project: “Implementation of an Electromechanical Garage Door Opener System”
Supervisor: Dr. Ataollah Ebrahimzadeh

HONORS AND DISTINCTIONS

- Ranked 1st in the university entrance exam for Ph.D. degree, 2012.
- Ranked 3rd among M.Sc. students in computer engineering department of Sharif University of Technology, Computer Architecture [GPA=18.15/20], 2012.
- Ranked 56th in national entrance exam for M.Sc. in computer architecture, 2010.

PUBLICATIONS

Journal Papers

- Ansari, Mohsen, Sepideh Safari, **Nezam Rohbani**, Alireza Ejlali, and Bashir M. Al-Hashimi, “Power-Efficient and Aging-Aware Primary/Backup Technique for Heterogeneous Embedded Systems,” *Transactions on Sustainable Computing (TSUSC)*, 2023.

- Shirmohammadi, Zahra, Mojtaba Farmani, Mina Mohseni, and **Nezam Rohbani**, "A Cluster-Based Energy-Aware Routing Algorithm for Wireless Sensor Networks," *Ad Hoc & Sensor Wireless Networks (AHSWN)*, pp. 303-315, 2022.
- Darbani, Paria, **Nezam Rohbani**, Hakem Beitollahi, and Pejman Lotfi-Kamran, "RASHT: A Partially Reconfigurable Architecture for Efficient Implementation of CNNs," *Transactions on Very Large Scale Integration (TVLSI) Systems*, IEEE, 2022.
- Navardi, Mozghan, Behnaz Ranjbar, **Nezam Rohbani**, Alireza Ejlali, and Akash Kumar, "Peak-Power Aware Life-Time Reliability Improvement in Fault-Tolerant Mixed-Criticality Systems," *Open Journal of Circuits and Systems*, pp. 199-215, IEEE, 2022.
- Safari, Maede, Zahra Shirmohammadi, **Nezam Rohbani**, and Hamed Farbeh, "LETHOR: a thermal-aware proactive routing algorithm for 3D NoCs with less entrance to hot regions," *The Journal of Supercomputing*, Elsevier, 2022.
- Bahrami, Fahimeh, Behnaz Ranjbar, **Nezam Rohbani**, and Alireza Ejlali, "PVMC: Reliability-Aware Task Allocation and Energy Management under Process Variation Heterogeneity in Mixed-Criticality Systems," *Transactions on Emerging Topics in Computing (TETC)*, IEEE, 2021.
- Saadatmand, Faezeh Sadat, **Nezam Rohbani**, Farshad Baharvand, and Hamed Farbeh, "TAMER: an adaptive task allocation method for aging reduction in multi-core embedded real-time systems," *The Journal of Supercomputing*, vol. 77, pp. 1939-1957, Springer, 2021.
- Sharifi, Ferdous, **Nezam Rohbani**, and Shaahin Hessabi, "Aging-Aware Context Switching in Multicore Processors Based on Workload Classification," *Computer Architecture Letters (CAL)*, vol. 19, no. 2, pp. 159-162. IEEE, 2020.
- **Rohbani, Nezam**, Hiroaki Gau, Sara Mohammadnejad, Tapas Kumar Maiti, Dondee Navarro, Mitiko Miura-Mattausch, Hans Jürgen Mattausch, and Hirotaka Takatsuka, "Power Reduction and BTI Mitigation of Data-Cache Memory Based on the Storage Management of Narrow-Width Values" *Transactions on Very Large Scale Integration Systems (TVLSI)*, vol. 27, no. 7, pp. 1675-1684. IEEE, 2019.
- **Rohbani, Nezam** and Seyed Ghassem Miremadi, "A Low-Overhead Integrated Aging and SEU Sensor," *Transactions on Device and Materials Reliability (TDMR)*, vol. 18, no. 2, pp. 205-213. IEEE, 2018.
- Miura-Mattausch, Mitiko, Hidenori Miyamoto, Hideyuki Kikuchihara, Tapas K. Maiti, **Nezam Rohbani**, Dondee Navarro, and Hans J. Mattausch, "Compact modeling of dynamic trap density evolution for predicting circuit-performance aging," *Microelectronics Reliability (MR)*, vol. 80, pp. 164-175. Elsevier, 2018.
- **Rohbani, Nezam**, Mojtaba Ebrahimi, Seyed Ghassem Miremadi, and Mehdi B. Tahoori, "Bias Temperature Instability Mitigation via Adaptive Cache Size Management," *Transactions on Very Large Scale Integration Systems (TVLSI)*, vol. 25, no. 3, pp. 1012-1022. IEEE, 2017.
- **Rohbani, Nezam**, Zahra Shirmohammadi, Maryam Zare, and Seyed Ghassem Miremadi, "LAXY: A Location-Based Aging-Resilient Xy-Yx Routing Algorithm for Network on Chip," *Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, vol. 36, no. 10, pp. 1725-1738. IEEE, 2017.
- Karimi, Maryam, **Nezam Rohbani**, and Seyed Ghassem Miremadi, "A Low Area Overhead NBTI/PBTI Sensor for SRAM Memories," *Transactions on Very Large Scale Integration Systems (TVLSI)*, vol. 25, no. 11, pp. 3138-3151. IEEE, 2017.

Conference Papers

- **Rohbani, Nezam**, Mohammad Arman Soleimani, Hamid Sarbazi-Azad, "CoolDRAM: An Energy-Efficient and Robust DRAM", *In Proceedings of the International Symposium on Low Power Electronics and Design (ISLPED)*, Vienna-Austria, ACM/IEEE, 2023.
- **Rohbani, Nezam**, Mohammad Arman Soleimani, Hamid Sarbazi-Azad, "PIPF-DRAM: Processing in Precharge-Free DRAM", *In Proceedings of the Design Automation Conference (DAC)*, San Francisco-USA, ACM/IEEE, 2022.
- **Rohbani, Nezam**, Sina Darabi, Hamid Sarbazi-Azad, "PF-DRAM: A Precharge-Free DRAM Architecture," *In Proceedings of the International Symposium on Computer Architecture (ISCA)*, pp. 126-138, Valencia-Spain, ACM/IEEE, 2021.

- **Rohbani, Nezam**, Masoumeh Ebrahimi, "SRAM Gauge: SRAM Health Monitoring via Cells Race," *In Proceedings of the International Symposium on Low Power Electronics and Design (ISLPED)*, Boston-USA, ACM/IEEE, 2021.
- Elaheh Malekzadeh, **Rohbani, Nezam**, Zhonghai Lu, Masoumeh Ebrahimi, "The Impact of Faults on DNNs: A Case Study," *In Proceedings of the International Symposium on Defect and Fault Tolerance in VLSI and Nanotechnology System (DFT)*, Athens-Greece, IEEE, 2021.
- Yari-Karin, Sina, Ali Sahraee, Javad Saber-Latibari, Mohsen Ansari, **Nezam Rohbani**, and Alireza Ejlali, "A comparative study of joint power and reliability management techniques in multicore embedded systems," *In Proceedings of the International Symposium on Real-Time and Embedded Systems and Technologies (RTEST)*, pp. 1-8. Tehran-Iran, IEEE, 2020.
- **Rohbani, Nezam**, Tapas Kumar Maiti, Dondee Navarro, Mitiko Miura-Mattausch, Hans Jürgen Mattausch, Hirotaka Takatsuka, "NVDL-Cache: Narrow-Width Value Aware Variable Delay Low-Power Data Cache" *In Proceedings of the International Conference on Computer Design (ICCD)*, pp. 264-272. Abu Dhabi-UAE, IEEE, 2019.
- Gau, Hiroaki, **Nezam Rohbani**, Tapas K. Maiti, Dondee Navarro, Mitiko Miura-Mattausch, Hans Jürgen Mattausch, and Hirotaka Takatsuka, "Consistent Predictive Simulation of SRAM-Cell Performance Degradation Including Both MOSFET Fabrication Variation and Aging," *In Proceedings of the 2nd Electron Devices Technology and Manufacturing Conference (EDTM)*, pp. 31-33. Kobe-Japan, IEEE, 2018.
- Farbeh, Hamed, **Nezam Rohbani**, "PCM-Oriented Cache Management Strategies for Solid-State Disks," *In Proceedings of of the CSI Symposium on Real-Time and Embedded Systems and Technologies (RTEST)*, pp. 16-23. Tehran-Iran, IEEE, 2018
- Mafari, Maede, Zahra Shirmohammadi, **Nezam Rohbani**, Hamed Farbeh, "WiP: Floating XY-YX: An Efficient Thermal Management Routing Algorithm for 3D NoCs," *In Proceedings of the 16th Intl Conf on Dependable, Autonomic and Secure Computing (DASC)*, pp. 736-741. Athens-Greece, IEEE, 2018.
- **Rohbani, Nezam**, Hidenori Miyamoto, Hideyuki Kikuchihara, Dondee Navarro, Tapas K. Maiti, Chenyue Ma, Mitiko Miura-Mattausch, Seyed Ghassem Miremadi, and Hans J. Mattausch, "Circuit-Aging Modeling Based on Dynamic MOSFET Degradation and Its Verification," *In Proceedings of the International Conference on Simulation of Semiconductor Processes and Devices (SISPAD)*, pp. 97-100. Kamakura-Japan, IEEE, 2017.
- Miura-Mattausch, Mitiko, Hidenori Miyamoto, Hideyuki Kikuchihara, Dondee Navarro, Tapas K. Maiti, **Nezam Rohbani**, Chenyue Ma, Hans J. Mattausch, "Modeling of Dynamic Trap Density Increase for Aging Simulation of any MOSFET Circuits," *In Proceedings of the European Solid-State Device Research Conference (ESSDERC)*, pp. 192-195. Leuven-Belgium, IEEE, 2017.
- Shirmohammadi, Zahra, **Nezam Rohbani**, and Seyed Ghassem Miremadi, "3D-DPS: An Efficient 3D-CAC for Reliable Data Transfer in 3D ICs," *In Proceedings of the European Dependable Computing Conference (EDCC)*, pp. 97-107. Gothenburg-Sweden, IEEE, 2016.
- Nazari, Reza, **Nezam Rohbani**, Hamed Farbeh, Zahra Shirmohammadi, and Seyed Ghassem Miremadi, "A²CM²: Aging-Aware Cache Memory Management Technique," *In Proceedings of the CSI Symposium on Real-Time and Embedded Systems and Technologies (RTEST)*, pp. 1-8. Tehran-Iran, IEEE, 2015.
- Hezaveh, Maryam, Zahra Shirmohammadi, **Nezam Rohbani**, and Seyed Ghassem Miremadi, "A fault-tolerant and energy-aware mechanism for cluster-based routing algorithm of WSNs," *In Proceedings of the International Symposium on Integrated Network Management (IM)*, pp. 659-664. Ottawa-Canada, IEEE, 2015.

Patent

- **Rohbani, Nezam**, Sina Darabi, Hamid Sarbazi-Azad, "Semiconductive Memory Device", *PCT-international patent system*, US Patent App. 17/846,102, 2022.

WORK EXPERIENCE AND SELECTED PROJECTS

- Embedded hardware design and firmware development of a secure USB flash memory, 2015-2018.

- Design and implementing wireless sensor nodes with higher data rate and lower power consumption in comparison with the standard MICAz WSN nodes, 2012.
- Design and implementing WiFi high speed data communication by ESP8266 for an embedded controlling application, 2014.
- AES acceleration by hardware-software codesign and using PCI Express Interface (implemented on Xilinx ML605 Evaluation board with a throughput of 8.7 Gbps), 2013.
- Accelerating of AES Coding, Using GPU Graphic Accelerator. 31x speedup has been achieved in comparison with Intel i7 740QM, 2011.
- Design and implementing an ultra-low power and long-life AMR (Automatic Meter Reading) system based on GSM communication infrastructure, 2016.
- Implementation of burglar alarm with the ability of online informing through SMS, 2015.
- Automatic car plate reader using Raspberry pi 3. An improved learning algorithm is implemented to boost accuracy of the system over time, 2015.
- Design and implementing asset tracking system based on Global Positioning System plus CAN interface for the ability of communicating with car ECU using SIM808, 2015.
- Implementing ultra-highspeed and accurate matching algorithm for fingerprint recognition on ARM microcontroller of STM32F4, 2014.
- Design and implementing full-speed USB communication for data storage in SAMSUNG e-MMC class 4.5, 2013.

TEACHING EXPERIENCE

- Teaching, **System-on-a-Chip (SoC)**, Institute for Research in Fundamental Sciences, Autumn 2021.
- Teaching, **Microprocessors**, Sharif University of Technology, Spring 2018.
- Teaching, **Microprocessors**, Amirkabir University of Technology, Autumn 2018.
- Instructor, **Hardware Lab.**, Sharif University of Technology, Spring 2013, Summer 2013, Spring 2014, Summer 2014, Spring 2015, Autumn 2015, Spring 2016, by Prof. Seyed Ghassem Miremadi.
- Instructor, **Computer Architecture Lab.**, Sharif University of Technology, Summer 2012, by Prof. Hossein Asadi.

SKILLS

Programming Languages	C/C++, C#, Python, Assembly, Matlab, Java, CUDA
Design, Synthesis, and Simulation Tools	HSPICE, HiSIM Aging Simulator, ISE Design Suite - Xilinx, Quartus, Synopsis Design Compiler, McPAT, Cadence Virtuoso, Cadence Spectre, Cadence SoC Encounter, ModelSim, Simulink, BookSim, DiskSim, Keil, Code Vision, AVR Studio, IAR, Altium Designer
Full System Simulation	gem5, SimpleScalar
HDL	VHDL, Verilog, SystemC
Operating System	Windows, Linux
Typesetting	LaTeX, Microsoft Word
Languages	Persian (native), English (fluent)

PERSONAL

- **Marital Status:** Single
- **Extracurricular:** PCB design, Robotic
- **Inventions:** Carpet-Maker Robot, Portable Color-Matching System, Semiconductive Memory Device

REFERENCE

- **Pejman Lotfi-Kamran**
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