Shadi Sheikhfaal

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US Permanent Resident

Education

2018–present ***Ph.D.*** **in Computer Engineering**, *University of Central Florida*, USA.
- **Advisor:** Prof. Ronald F. DeMara
- **Selected Courses:** Neuromorphic Computing Architecture Circuit and Device, Field-Programmable Gate Array, Emerging Device Computer Architectures

2012–2014 ***M.Sc.*** **in Computer Engineering, Computer Systems Architecture**, *Science and Research Branch of IAU*, Iran.
- **Advisor:** Prof. Keivan Navi
- **Thesis:** Design of efficient sequential circuits at Nano scale by Quantum-dot cellular automata
- **Selected Courses:** Advanced VLSI, Advanced Computer Architecture, Arithmetic Processors, Test and Testability Design, Advanced Networks

2008–2012 ***B.Sc.*** **in Computer Engineering, Hardware**, *Ardebil Branch of IAU*, Iran.
- **Advisor:** Dr. Mehdi Effatparvar
- **Thesis:** Computational Methods
- **Selected Courses:** Machine Language and System Programming, Digital Electronics, Signals and Systems, Microprocessors, VLSI Circuit Design, Interface Circuit Design, Advanced Programming

Research Interests

- Biologically Inspired (Neuromorphic) Computing
- Spiking Neural Networks
- Accelerator Design for Deep Neural Network
- Spin-based computing systems/ Nano magnetic logic
- Quantum-dot cellular automata (QCA)
- Low power VLSI circuits

Publications

Peer-Reviewed Journal publications

2020 S. Sheikhfaal, and R. F. DeMara, "Short-Term Long-Term Compute-In-Memory Architecture: A Hybrid Spin/CMOS Approach Supporting Intrinsic Consolidation", *IEEE Journal of Exploratory Solid-State Computational Devices and Circuits (JXCDC)*, vol. 6, no. 1, pp. 62-70, June 2020, doi: 10.1109/JXCDC.2020.2983450

2020 H. Pourmeidani, S. Sheikhfaal, R. Zand, and R. F. DeMara, "Probabilistic Interpolation Recoder for Energy-Error-Product Efficient DBNs with p-bit Devices", *IEEE Transactions on Emerging Topics in Computing (TETC)*, doi: 10.1109/TETC.2020.2965079.

2019 A. Roohi, S. Sheikhfaal, S. Angizi, D. Fan, and R. F. DeMara, "ApGAN: Approximate GAN for Robust Low Energy Learning from Imprecise Components", *IEEE Transactions on Computers (TC)*, Vol. 69, No.3, March 2020.

2019 S. D. Pyle, R. Zand, S. Sheikhfaal, and R. F. DeMara, "Subthreshold Spintronic Stochastic Spiking Neural Networks with Probabilistic Hebbian Plasticity and Homeostasis", *IEEE Journal of Exploratory Solid-State Computational Devices and Circuits (JxCDC)*, Special Issue on Non-Volatile Memory for Efficient Implementation of Neural/Neuromorphic Computing, 2019.

2019 R. F. DeMara, S. Sheikhfaal, P. J. Wilder, B. Chen, and R. Hartshorne, "BLUESHIFT: Rebalancing Engineering Engagement, Integrity, and Learning Outcomes across an Electronically-Enabled Remediation Hierarchy," *ASEE Computers in education Journal*, vol. 22, 2019.

2017 A. M. Chabi, A. Roohi, H. Khademolhosseini, S. Sheikhfaal, S. Angizi, K. Navi, and R. F. DeMara, "Towards ultra-efficient QCA reversible circuits," *Microprocessors and Microsystems*, Vol. 49, pp. 127-138, 2017.

2016 K. Navi, S. Khammar, S. Angizi, S. Sheikhfaal, and S. Angizi, "Excess Electron Quantum-Dot Cellular Automata Cell," *Quantum Matter*, ASP, Vol. 5, no. 1, pp. 188-190, 2016.

2015 S. Sheikhfaal, S. Angizi, S. Sarmadi, M. H. Moaiyeri, and S. Sayedsalehi, "Designing efficient QCA logical circuits with power dissipation analysis", *Microelectronics Journal*, Elsevier, Vol. 46, No. 6, pp. 462–471, 2015. **(Most Cited Article)**

2015 S. Angizi, F. Danehdaran, S. Sarmadi, S. Sheikhfaal, N. Bagherzadeh, and K. Navi, "An Ultra-high Speed and Low Complexity QCA Full Adder", *Journal of Low Power Electronics*, ASP, Vol. 11, No. 2, pp. 173-180, 2015.

2015 S. Sheikhfaal, K. Navi, S. Angizi, and A. Habibizad Navin, "Designing High Speed Sequential Circuits by Quantum- Dot Cellular Automata: Memory Cell and Counter Study", *Quantum Matter*, ASP, Vol. 4, No. 2, pp. 190-197, 2015.

2015 S. Sarmadi, S. Azimi, S. Sheikhfaal, S. Angizi, "Designing Counter Using Inherent Capability of Quantum-dot Cellular Automata Loops", *International Journal of Modern Education & Computer Science*, Vol. 7, No. 9, pp. 22-28, 2015.

Conference publications

2019 S. Sheikhfaal, S. D. Pyle, S. Salehi and R. F. DeMara, "An Ultra-Low Power Spintronic Stochastic Spiking Neuron with Self-Adaptive Discrete Sampling", *62nd IEEE International Midwest Symposium on Circuits and Systems (MWSCAS)*, 4-7 August, 2019, Dallas, TX, USA (Accepted).

2019 R. F. DeMara, T. Tian, S. Sheikhfaal, and W. Howard, "Adapting Mixed-Mode Instructional Delivery to Thrive within STEM Curricula," *in Proceedings of American Association for Engineering Education Annual Conference (ASEE-2019)*, Tampa, FL, USA, June 16 – 19, 2019.

2019 R. F. DeMara, J. E. Beck, L. O. Campbell, R. Hartshorne, S. Spiegel, Z. Chen, M. Dagley, E. Hernandez, T. Tian, T. Gibson, S. Sheikhfaal, A. Tatulian, H. Pourmeidani, and H. Esteves, "Methods and Outcomes of the NSF Project on Synthesizing Environments for Digitally-Mediated Team Learning," *in Proceedings of American Association for Engineering Education Annual Conference (ASEE-2019)*, Tampa, FL, USA, June 16 – 19, 2019.

2015 M. R. Jahangir, S. Sheikhfaal, S. Angizi, K. Navi, and F. Ahmad, Designing Nanoelectronic-compatible 8-bit Square Root Circuit by Quantum-dot Cellular Automata, *In Proceeding of The IEEE International Symposium on Nanoelectronic and Information Systems*, Indore, India, December 21st-23rd, 2015.

2013 S. Angizi, S. Sheikhfaal, S. Sarmadi, and K. Navi, A Novel Design for T Flip-Flop by Quantum-dot Cellular Automata, *In proceeding of: 10th National Conference on Computer and Intelligent Systems*, Tabriz-Iran, August 2013.

Professional Experience

A. Research Assistant

2018-present **Graduate Research Assistant** at Department of Electrical and Computer Engineering of University of Central Florida, Orlando, FL

2014-2016 **Research Assistant** at School of Computer Science, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran

2012-2016 **Senior Research Assistant** at Nanotechnology and Quantum Computing Laboratory, Shahid Beheshti University, G. C., Tehran, Iran

B. Proctor

2019 **Evaluation and Proficiency Center (EPC)** at University of Central Florida, Orlando, FL

Professional Service

A. Reviewer of the high Rank Journals

- ACM Journal of Emerging Technologies in Computing Systems
- Elsevier Microelectronics Journal/ Microprocessors and Microsystems
- Journal of Circuits, Systems, and Computers

B. Organizer

- Co-Organizer of Digitally-Mediated Team Learning NSF Synthesis and Design Workshop (DMTL), Orlando, FL, USA, April 2019
- Co-Organizer of 36th IEEE International Conference on Computer Design (ICCD), Orlando, FL, USA, October 2018

Technical Skills

- OS: *Linux/ Windows/ DOS*
- Programming: *Python/ C++/ Matlab*
- HDL Programming: *Verilog*
- Device level tools: *OOMMF*
- Circuit level tools: *HSPICE/ Cadance Virtuoso/ Design Compiler/ Modelsim/ Berkeley's ABC/ Proteus/ QCADesigner/ QCAPro/ HDLQ*
- Architectural level tools: *Cacti/ NVsim*

Presentations

2020 MRAM-Based Arrays Towards Short-Term Long-Term Memory Architectures and Stochastic Recurrent Neural Networks, *Computing Advances by Probabilistic Spin Logic (CAPSL) annual review meeting, funded by the Semiconductor Research Corporation (SRC)*, USA.

2020 Short-Term Long-Term Architecture: A Hybrid Spin/CMOS Approach Supporting Intrinsic Consolidation, *TECHCON Event funded by Semiconductor Research Corporation (SRC)*, USA.

2019 An Ultra-Low Power Spintronic Stochastic Spiking Neuron with Self-Adaptive Discrete Sampling, *IEEE International Midwest Symposium on Circuits and Systems (MWSCAS)*, Dallas, TX, USA.

2019 Leveraging Emerging Device Stochasticity, Non-Volatility, and Power Efficiency in Spiking Neural Networks, *Computing Advances by Probabilistic Spin Logic (CAPSL) annual review meeting, funded by the Semiconductor Research Corporation (SRC)*, Indianapolis, IN, USA.

2019 Leveraging Emerging Device Stochasticity, Non-Volatility, and Area Utilization in Neuromorphic Computation, *Design and Automation Conference (DAC2019)*, Las Vegas, Nev, USA.

2019 Computer-Based Active Learning in a Large Enrollment Engineering Class, *Digitally-Mediated Team Learning (DMTL) NSF Synthesis and Design Workshop*, University of Central Florida, Orlando, FL, USA.

Academic Honors and Distinctions

2020 Recipient of the NSF-funded student participation award at the International Green and Sustainable Computing conference (IGSC 2020).

2020 Recipient of the 2020 Grace Hopper Celebration (GHC) Student Scholarship, USA.

2019 Recipient of the best poster award at the Computing Advances by Probabilistic Spin Logic (CAPSL) annual review meeting, funded by the Semiconductor Research Corporation (SRC), Indianapolis, IN, USA.

2019 Recipient of the 56th Design Automation Conference (DAC2019) A. Richard Newton Graduate Scholarship, Las Vegas, NV, USA.

2017 Most Cited Article in Elsevier's Microelectronics Journal

2015 Iran Nanotechnology Initiative Council Award for selected journal publications

2015 Iran Nanotechnology Initiative Council Award for selected M.Sc. thesis in the field of Nanotechnology

2014 Ranked 2nd among Graduate Students of Computer Engineering, Computer Systems Architecture from Science and Research Branch of IAU.

References

Available upon request