

Ehsan Rahimi, PhD

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AREAS OF INTEREST Nano & Molecular Devices, Quantum Physics & Chemistry, Sensors & Detectors

CAREER PROFILE **Shahrood University of Science & Technology**, Semnan, Iran

Assistant Professor (since 2013)

- Research Group: *Micro and Nano Devices*
- Area of Research: Nanoelectronics, Quantum Electronics

Shanghai University, Shanghai, China

Visiting Scholar, International Center for Quantum and Molecular Structures, 2017

- Area of Research: Molecular Devices
- Project Grant: Shanghai University

The University of Sydney, Sydney, Australia

Research Scholar, School of Chemistry, 2012

- Scholarship: *The University of Sydney*.
- Project: *Evaluation & Modelling of Molecular Electronic Devices*.
- Supervisors : Prof. Jeffery R. Reimers & Prof. Noel S. Hush

Iran University of Science & Technology (IUST), Tehran, Iran

Ph.D. (Summa Cum Laude), Electrical and Electronics Engineering, 2012

- Thesis Topic: *Design and Modelling of Molecular Quantum-dot Cellular Automata*
- Adviser: Prof. Sh. M. Nejad
- Area of Research: Nanoelectronics

Norwegian University of Science & Technology (NTNU), Norway

International Researcher, Department of Chemistry, 2011

- Scholarship: *Ministry of Science, Research & Technology of Iran*.
- Project: *Force Fields and Polarizabilities*.
- Supervisors : Prof. Per-Olof Astrand

Iran University of Science & Technology (IUST), Tehran, Iran

M.S. (Hons.), Electrical and Electronic Engineering, 2007

- Honors : *First rank among all M.S. students of EE department*
- Thesis Topic: *Design and Implementation of Power Analysis Attacks on Block Cipher Cryptographic Processors*
- Adviser: Dr. Ali Sadr
- Area of Research: Cryptography Engineering

Ferdowsi University of Mashhad, Mashhad, Iran

B.S., Electrical and Electronic Engineering, 2005

- Thesis Topic: *Design and Implementation of an Event Recorder with $\mu 80196$*
- Electrical specialization (emphasis on digital electronics)

HONORS/AWARDS

- *Outstanding Student, 1st rank among more than 150 students within the MS degree program, School of Electrical Engineering, IUST.*
- *Rank 1st amongst the outstanding students of the university, 8th meeting with honor students of IUST.*
- *IEEE, Best Paper Award, CSNDSP08, Austria 2008.*
- *Selected in the second round of National Chemistry Olympiad.*
- *Award for the Top Intern-ship Project, Ferdowsi University of Mashhad.*
- *Grant from International Center for Quantum & Molecular Structures, China (2017).*
- *Grant from School of Chemistry, The University of Sydney, Australia (2012).*
- *Grant from Ministry of Science, Research and Technology of Iran and NTNU Norway (2010).*
- *DFG German Grant, University of Siegen, Germany (2008).*
- *Grant from School of Computational Engineering, Darmstadt, Germany (2008)*
- *Grant from European Union, the University of Bochum, Germany (2009).*

PUBLICATIONS

- H. Sheibani and E. Rahimi, "Single-electron fault tolerance in quantum cellular automata majority gate," *J. Circuits Syst. Comput.*, vol. 30, p. 2150168, 2021.
- M. Parvane, E. Rahimi, and F. Jafarinejad, "Optimization of quantum cellular automata circuits by genetic algorithm," *International Journal of Engineering*, vol. 33, pp. 229–236, 2020.
- A. G. Farbod and E. Rahimi, "Non-adiabatic energy dissipation of quantum cellular automata logic devices," *IET Circuits, Devices & Systems*, vol. 14, pp. 623–628, 2020.
- E. Rahimi and J. R. Reimers, "Molecular quantum cellular automata cell design trade-offs: latching vs. power dissipation," *Phys. Chem. Chem. Phys.*, vol. 20, pp. 17 881–17 888, 2018.
- P. Bayanipour and E. Rahimi, "Distance effects on the charge distribution in electronegativity equalization method," *ICEE Iran Conf. Elec. Eng.*, vol. 1, 2017.
- S. Dorouki and E. Rahimi, "The effect of temperature on molecular electronic devices," *ICEE Iran Conf. Elec. Eng.*, vol. 1, pp. 1–4, 2016.
- E. Rahimi, "Energy dissipation of quantum-dot cellular automata logic gates," *Micro & Nano Letters*, vol. 11, pp. 369–371, 2016.
- E. Rahimi and S. M. Nejad, "Radius of effect in molecular quantum-dot cellular automata," *Mol. Phys.*, vol. 111, pp. 697–705, 2013.
- E. Rahimi and S. M. Nejad, "Scalable minority gate: a new device in two-dot molecular quantum-dot cellular automata," *Micro & Nano Letters*, vol. 7, pp. 802–805, 2012.
- E. Rahimi and S. M. Nejad, "Quasi-classical modeling of molecular quantum-dot cellular automata multidriver gates," *Nanoscale Res. Lett.*, vol. 7, p. 274, 2012.
- S. Mohammadnejad, S. Samani, and E. Rahimi, "Optical characteristics of zno-based photodetectors doped with au nanoparticles," *IEEE Conf. Mech. Elec. Eng., Japan*, vol. 1, pp. 1–4, 2010.

- S. M. Nejad, S. Samani, and E. Rahimi, "Characterization of responsivity and quantum efficiency of tio 2—based photodetectors doped with ag nanoparticles," *IEEE Conf. Appl. Elec., Czech*, vol. 2, pp. 390–394, 2010.
- S. Mohammadnejad, P. Khademi, and E. Rahimi, "Analysis and comparison of electrical characteristics for a single molecule wire with different electrode materials," *IEEE Conf. Com. Sys., Net. & Digital Sig. Proc., England*, vol. 1, pp. 332–335, 2010.
- S. M. Nejad, F. A. Kakhki, and E. Rahimi, "A simple mathematical model for clocked qca cells," *IEEE Conf. Com. Sys. Net. & Digital Sig. Proc., England*, vol. 1, pp. 351–354, 2010.
- E. Rahimi and S. M. Nejad, "A novel architecture for quantum-dot cellular rom," *IEEE Conf. Com. Sys. Net. & Digital Sig. Proc., England*, vol. 1, pp. 1–4, 2010.
- S. M. Nejad, S. Enayati, and E. Rahimi, "Zno based uv photodetector with improvement of quantum efficiency and dark current," *Iran Conf. Opt. Laser Eng., Isfahan*, vol. 1, pp. 329–334, 2009.
- E. Rahimi and S. M. Nejad, "Time and frequency domain analysis of frequency chirp and raman response for soliton propagation in nonlinear optical fibers," *ICEE Iran Conf. Elec. Eng.*, vol. 1, pp. 11–14, 2009.
- E. Rahimi and S. M. Nejad, "Secure clocked qca logic for implementation of quantum cryptographic processors," *IEEE Conf. Appl. Elec., Czech*, vol. 1, pp. 217–220, 2009.
- S. Mohammadnejad, S. E. Maklavani, and E. Rahimi, "Dark current reduction in zno-based msm photodetectors with interfacial thin oxide layer," *IEEE Conf. High Cap. Opt. Net., Malaysia*, vol. 1, pp. 259–264, 2008.
- E. Rahimi and S. M. Nejad, "Analysis of super-gaussian ultra-short pulse propagation in nonlinear optical fibers," *IEEE Conf. High Cap. Opt. Net., Malaysia*, vol. 1, pp. 135–140, 2008.
- E. Rahimi and A. Sadr, "An investigation through different bits leakage in power analysis attacks," *ISCC Conf. Iran Sec. Com.*, vol. 1, pp. 1–4, 2007.

BOOK CHAPTERS S. Nejad and E. Rahimi, "QCA: The prospective Technology for Digital Telecommunication Systems". In: *Nanotechnology for Telecommunications, CRC Pres, 2010*.

- REFEREE SERVICE
- *Editorial Board of HRPUB Nanoscience & Nanoengineering*
 - *Editorial Board of American Association for Science and Technology*
 - *Reviewer of IEEE Trans. on Nanotechnology*
 - *Reviewer of Journal of Circuits, Systems, and Computers*
 - *Reviewer of Elsevier Journal of Microelectronics*
 - *Reviewer of GACR :The Czech Science Foundation*
 - *Reviewer of International Journal of Modern Physics and Application*
 - *Reviewer of Iranian Journal of Electrical and Electronic Engineering (IJEEE)*
 - *Reviewer of Iranian Conference on Electrical Engineering*

TEACHING **Shahrood University of Technology**, Shahrood, Iran

EXPERIENCE

Assistant Professor, School of Electrical Engineering

since 2013

- Quantum Electronics (Graduate)
- Nanoelectronics (Graduate)
- Semiconductor Devices (Graduate)

- Biophysics (Undergraduate)
- Electric Circuits (Undergraduate)
- Modern Physics (Undergraduate)
- Physics of Solid State Devices (Undergraduate)
- Digital Logic Design (Undergraduate)
- Probability and Statistics (Undergraduate)
- Numerical Analysis (Undergraduate)

SUPERVISED
PROJECTS

- H. Zareii, “Design and simulation of the current in a 2D nanodevice”, *MSc Thesis*, 2020.
- A. H. Mehrabani, “Design and simulation of an HBT transistor with gate controlled current”, *MSc Thesis*, 2020.
- A. Farbod, “Simulation of energy dissipation in a QCA full adder circuit”, *MSc Thesis*, 2019.
- H. Sheibani, “Simulation of the single electron fault in QCA technology”, *MSc Thesis*, 2019.
- H. Nadali, “Modeling of the single molecule solar cell using non-equilibrium Green’s function”, *MSc Thesis*, 2018.
- E. Mohammadi, “Cancer cell detection via molecular electronics methods”, *MSc Thesis*, 2018.
- M. Malek, “Simulation of conductivity of C60 diode using quantum dot model”, *MSc Thesis*, 2018.
- E. Yaghoobian, “Simulation of the access time of a QCA RAM”, *MSc Thesis*, 2018.
- M. Parvaneh, “Design of QCA circuits using meta-heuristic genetic algorithm”, *MSc Thesis*, 2017.
- P. Bayanipour, “Electronegativity equalization method for the calculation of electric charges in nano devices”, *MSc Thesis*, 2017.
- M. Khakpour, “Optimization of Ram Memory in QCA Nanotechnology”, *MSc Thesis*, 2017.