

NOEL MICHAEL D'SOUZA

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Current doctoral candidate with diverse academic and research background. Keen experimentalist with proficiency in key nanofabrication and nanomaterial characterization techniques and tools

EDUCATION

- 9/10 – Present **Ph.D. Candidate, Engineering, Mechanical Engineering track**
Virginia Commonwealth University, Richmond, VA
Thesis topic: Applications of 4-state nanomagnetic logic using multiferroic nanomagnets possessing biaxial magnetocrystalline anisotropy and experiments on 2-state multiferroic nanomagnetic logic
- 12/2008 **Master of Science, Electrical Engineering** GPA: 3.8/4.0
University of Cincinnati, Cincinnati, OH
Thesis topic: A Simulation Study of Zinc Oxide Nanowire Field-Effect Transistors
- 6/2006 **Bachelor of Science, cum laude, Electrical Engineering** GPA: 3.6/4.0
University of Cincinnati, Cincinnati, OH

EXPERIENCE

- 9/10 – Present Research/Teaching Assistant, Department of Mechanical Engineering, Virginia Commonwealth University, Richmond, VA
- Currently conducting experiments to investigate non-Boolean computation in magnetic tunnel junctions (MTJs) using strain
 - Experimental demonstration of strain-induced magnetization switching of single-domain magnetostrictive nanomagnets on a piezoelectric substrate
 - Performed simulation studies on magnetization dynamics of multiferroic materials for low-power, high-density applications and development of device fabrication techniques
 - Managed Mechatronics Laboratory and supervised lab sessions for a class of 75 students; instructed students in the use of electronics equipment and software for one semester
 - Mentored high school student through the Richmond Area Program for Minorities in Engineering (RAPME) on e-beam lithography to fabricate nanomagnetic structures
 - Organized 'Building Logic with Nanomagnets' workshop as part of the MathScience Innovation Center Grades 6-8 Student Conference, (2011, 2012)
- 9/05 – 12/08 Graduate Student Assistant, Department of Ob/Gyn, University of Cincinnati, Cincinnati, OH
- Generated faculty/resident questionnaires on New Innovations Residency Management Suite, systematized timely dispatch of online surveys and compiled final evaluation results
 - Trained and provided technical assistance to two Medical Student Administrators regarding creation and management of the New Innovations tool
- 4/05 – 9/05 Digital Circuit Design Co-op Engineer, Advanced Micro Devices (AMD), Sunnyvale, CA
- Performed circuit simulations of an embedded memory technology researched by the R&D division and modified circuit configurations based on extracted data
 - Generated control files to report timing paths of circuits
- 4/04 – 9/04 Digital Circuit Design Co-op Engineer, Advanced Micro Devices (AMD), Sunnyvale, CA
- Performed periodic updates of circuit schematics according to technology node specifications as part of the Athlon 64 team working on the K8 processor core
 - Fixed a PERL script that failed to extract duplicate components in the schematic database

SKILLS & ABILITIES

Design and Analysis

Scanning Electron Microscopy (SEM)
Energy dispersive X-ray Spectroscopy (EDX) using SEM
Electron-beam lithography (Nabity, Raith-Elphy)
Transmission Electron Microscopy (ongoing training)
Physical vapor deposition (electron-beam, thermal)
Radio-Frequency (RF) Sputtering
Atomic/Magnetic Force Microscopy (Bruker/Veeco)
DesignCAD
Dektak Surface Profilometer

Programming Languages

MATLAB, PERL, Visual C++, HSPICE, VHDL, Mathematica

HONORS & AWARDS

- Special Recognition – Outstanding Graduate Research Assistant Award, School of Engineering, VCU, 2013-14
- Who's Who Among Students at American Universities and Colleges, VCU, 2014
- VCU Graduate School Dissertation Assistantship, Spring 2014
- Special Recognition – Outstanding Graduate Research Assistant Award, School of Engineering, VCU, 2012-13
- Student Spotlight – ASME/AIAA Newsletter, Spring 2013
- GMAG Student Travel Award for American Physical Society Conference – March '13
- Best Student Paper – 2011 ASME SMASIS Conference (Multifunctional Materials Symposium)
- First Place – University of Cincinnati Calculus Competitive Exam, '02
- Harold N. & Jean L. Herman Foundation Scholarship, Univ. of Cincinnati, 2002-03
- College of Engineering Dean's List, Univ. of Cincinnati – Fall '01; Winter, Spring '02; Fall, Summer '03

JOURNAL PUBLICATIONS

1. **D'Souza, N.**; Salehi Fashami, M.; Bandyopadhyay, S.; Atulasimha, J.; "Strain Induced Clocking of Nanomagnets for Ultra Low Power Boolean Logic", <http://arxiv.org/abs/1404.2980>, submitted for publication, 2014
2. Salehi Fashami, M.; **D'Souza, N.**; Bandyopadhyay, S.; Atulasimha, J.; "Hybrid Spintronics-Straintronics: Super Energy Efficient Nanomagnetic Memory and Logic Clocked with Strain", under preparation, 2014
3. Salehi Fashami M.; **D'Souza, N.**; "Implementation of 4-state nanomagnetic devices with shape anisotropy", <http://arxiv.org/abs/1403.2303>, submitted for publication, 2014
4. Salehi Fashami, M., **D'Souza, N.**, Atulasimha, J., Bandyopadhyay, S. "Strain-Induced Magnetization Dynamics: Paradigm for ultra-low energy computing" under preparation, 2014
5. **D'Souza, N.**; Atulasimha, J.; Bandyopadhyay, S.; "An ultrafast image recovery and recognition system implemented with nanomagnets possessing biaxial magnetocrystalline anisotropy", *Nanotechnology*, IEEE Trans. on, 11(5), 896-901, 2012
6. **D'Souza, N.**; Atulasimha, J.; Bandyopadhyay, S.; "Energy-Efficient Bennett Clocking Scheme for Four-State Multiferroic Logic", *Nanotechnology*, IEEE Trans. on, 11(2), 418-425, 2012
7. **D'Souza, N.**; Atulasimha, J.; Bandyopadhyay, S.; "Four-state nanomagnetic logic using multiferroics", *Journal of Physics D: Applied. Physics*, 44, 265001, 2011

BOOK CHAPTERS

1. **D'Souza, N.**; Bandyopadhyay, S.; Atulasimha, J. "Four-state hybrid spintronics-straintronics: Extremely low-power information processing with multiferroic nanomagnets possessing biaxial anisotropy", submitted for publication in *Emerging VLSI Circuits*, Eds. Tomasz Wojcicki and Kris Iniewski, CRC Press, 2014

PATENTS

- Atulasimha, Jayasimha and Bandyopadhyay, Supriyo. 2012. Planar Multiferroic/Magnetostrictive Nanostructures as Memory Elements, Two-Stage Logic Gates and Four-State Logic Elements for Information Processing. Patent Application 13/447,431, filed with USPTO 4/16/2012, pending review (**Noel D'Souza** – 20% contribution to invention disclosure)

REVIEWED ARTICLES

- Reviewed 1 manuscript in *J. Phys.: Condens. Matter*

CONFERENCES**(Proceedings and Talks)**

1. 72nd Device Research Conference, Santa Barbara, CA – June 2014 (Poster presentation)
2. American Physical Society (APS) Conference – March 2014 (talk & abstract only, presenting author)
3. ASME SMASIS 2013 – September 2013 (Talk & abstract only, co-author)
4. SPIE Optics + Photonics Conference – August 2013 (poster presentation, co-author)
5. American Physical Society (APS) Conference – March 2013 (talk & abstract only, presenting author)
6. American Physical Society (APS) Conference – March 2013 (talk & abstract only, co-author)
7. ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems – September 2012 (technical presentation only, co-author)
8. American Physical Society Conference – March 2012 (talk & abstract only, presenting author)
9. ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems – August 2011 (Proceedings and Student Paper Presentation, presenting author)
D'Souza, N.; Atulasimha, J.; Bandyopadhyay, S.; “Four-State Straintronics: Extremely Low Power Nanomagnetic Logic Using Multiferroics With Biaxial Anisotropy”, ASME Conf. Proc. 2011, 239-247, 2011

PRESENTATIONS & WORKSHOPS

1. NSF Nanoscale Science and Engineering Grantees Conference – December 2011 (poster)
2. SRC-NRI Site-review (NSF Grant# 1124714): Ultra Low-Power Collective Nanomagnetic Computing Using Multiferroics With Biaxial Anisotropy – June 2012

ORGANIZATIONS

1. American Physical Society (APS) – Student Member since November 2011
2. Graduate Mechanical & Nuclear Engineers, VCU – President since April 2013
3. Engineering Graduate Student Association, VCU – Secretary since October 2013

COMMUNITY SERVICE

- Assisted in Meal Packaging Program organized by Stop Hunger Now hunger relief organization – Jan '13
- Volunteered as Table Host for Community Thanksgiving Feast (The Giving Heart – Nov '11)