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## 1. GENERAL INFORMATION

### ACADEMIC QUALIFICATIONS

*Doctor of Philosophy, Aerospace Engineering, 2003- 2006, University of Maryland, College Park.*

Title: “Characterization and Modeling of the Magnetomechanical behavior of Iron-Gallium alloys”.

*Master of Science (Non-thesis), Aerospace Engineering, 2001-2003, Univ. of Maryland, College Park.*

*Bachelor of Technology, Mechanical Engineering, 1997-2001,*  
Indian Institute of Technology, Madras, India.

### WORK/ RESEARCH EXPERIENCE

*a. Qimonda Professor of Mechanical and Nuclear Engineering, July 2017-current*

*Professor of Electrical and Computer Engineering (Courtesy appointment), July 2017-current*  
Virginia Commonwealth University (VCU).

*b. Qimonda Associate Professor of Mechanical and Nuclear Engineering, July 2013-June 2017*  
*Associate Professor of Electrical and Computer Engineering (Courtesy appt.), July 2013-June 2017*  
Virginia Commonwealth University (VCU).

*c. Assistant Professor, August 2008 to June 2013 (Qimonda Assistant Prof. July 2012-June 2013)*  
Department of Mechanical and Nuclear Engineering, Virginia Commonwealth University (VCU).

*d. Research Associate, 2007-2008*  
Center for Research in Scientific Computation/ Department of Mathematics,  
North Carolina State University, Raleigh, U.S.A. *Non-linear behavior of magnetostrictive materials.*

*e. Consultant, Hindustan Aeronautics Ltd., August 2007*  
Worked on environmental control system for the Intermediate Jet Trainer.

*f. Postdoctoral Research Fellow, 2006- 2007*  
Center for Smart Structures and Materials, Royal Military College & CMACN, Queens University,  
Kingston, Canada: *Modeling Magneto-electric composites and Magnetic Shape Memory Alloys.*

### PROFESSIONAL ORGANIZATIONS

*Senior Member, IEEE-Institute of Electrical and Electronics Engineers (Magnetics and Electron Device Society).*

*Fellow, ASME-American Society of Mechanical Engineers.*

*(Also serve on the ASME Adaptive Structures and Material Systems (ASMS) branch technical committee member).*

*Member, APS- American Physical Society (also APS GMAG Topical Group on Magnetism and its Applications).*

### RESEARCH ACTIVITIES (PAST, CURRENT AND EMERGING)

1. “Straintronics”: Energy efficient nanomagnetic computing with strain (current)
2. Magnetization dynamics in nanomagnets and skyrmions (current)
3. Spin transport in nanowires (current)
4. Understanding the origin of magnetism in novel materials and atomic assemblies (emerging)
5. Electro-hydrodynamic printing of ultra-small magnetic features (emerging)

## 6. Magnetostrictive FeGa alloys: single and polycrystalline behavior (past)

### KEY HIGHLIGHTS/MEDIA REPORTS/AWARDS/SCHOLARSHIPS/ (Latest to oldest)

1. Elected Fellow of the ASME-American Society of Mechanical Engineers, December, 2017.
2. Article highlighted in Back Cover of Physical Chemistry Chemical Physics, 2017.
3. Work on fixed skyrmion based magnetic storage highlighted in Physics.org  
<https://phys.org/news/2016-11-big-cloud-storage-energy-efficient.html>
4. Nano Letters paper on first experimental demonstration of strain clocked nanomagnetic logic highlighted in Chemical and Engineering News in February, 2016.  
<http://cen.acs.org/articles/94/web/2016/02/Magnetic-Pull-Ultralow-Power-Computing.html>
5. Press in 2014 and 2015 on various straintronic experimental and theoretical device proposals. For example: <http://phys.org/news/2015-07-straintronic-neuron-greatly-neural.html>  
<http://phys.org/news/2014-09-non-volatile-memory-energy-efficiency-magnitude.html>; <http://nanotechweb.org/cws/article/lab/62960>
6. NSF CAREER award, 2013.
7. Appointed to the VCU Qimonda Endowed Chair Professorship, July 2012.
8. Elected as IEEE Senior Member, November 2011.
9. Work on straintronics: ultra-low power computing with multiferroic nanomagnets appeared on Nature highlights [http://www.nature.com/nature/journal/v476/n7361/full/476375c.html?WT.ec\\_id=NATURE-20110825](http://www.nature.com/nature/journal/v476/n7361/full/476375c.html?WT.ec_id=NATURE-20110825)  
EE Times [www.eetimes.com/electronics-news/4219545/Researchers-aim-for-energy-harvesting-CPUs](http://www.eetimes.com/electronics-news/4219545/Researchers-aim-for-energy-harvesting-CPUs)  
Physics World <http://physicsworld.com/cws/article/news/44910>.
10. Corresponding author on papers selected as IOP Nanotechnology 2011 Highlight and IOP Smart Materials and Structures 2011 Highlight.
11. PRIP (VCU Presidential Research Incentive Program) award: grant \$50,000 (my share \$25,000), July 2010 and Qimonda Discretionary Funds for Junior Faculty Development, 2011.
12. *Best Student Paper Award* for the talk titled “Effect of Stoichiometry on Sensing Behavior of Iron-Gallium”, at the SPIE-The International Society of Optical Engineering Conference on Smart Structures and Materials, San Diego, March 2004.
13. *Graduate School Fellowship*, Department of Aerospace Engineering, University of Maryland, College Park, September 2001- May 2002.
14. *Junior Summer Research Fellow*, *Indian Academy Sciences*. Worked with Prof P.L. Sachdev, Applied Mathematics, Indian Institute of Science on “Analytical and Numerical solution of non-linear Burger’s equation” in summer 2000.
15. *Awarded the National Talent Scholarship in 1997*. Awarded annually to 750 high school students in grade 10 by the government of India to pursue a career in Engineering/Science/Social Science.

### STUDENT AWARDS

1. Mohammad Salehi Fashami and Noel D’Souza won doctoral dissertation fellowships in 2013.
2. Noel D’Souza was awarded a student travel grant for APS March 2013 and featured in a student spotlight in ASME & AIAA Adaptive Structures & Material Systems Newsletter 2013.
3. Noel D’Souza won the best student paper award (multifunctional materials, SMASIS 2011).

## 2. RESEARCH WORK

### a. Grants that are currently funded

| Agency/<br>Mechanism  | Title   | Role  | Duration/Amount   | Status |
|---|---|---|---|--------|
| NSF:<br>Unsolicited Software<br>Hardware<br>Fundamentals, CCF,<br>CISE. | SHF: Small: Collaborative<br>Research: Energy Efficient<br>Strain Assisted Spin Transfer<br>Torque Memory   | <b>PI (with 2 co-<br/>PIs)</b>                          | <b>10/01/18 to 09/30/21</b><br><br><b>\$500 K</b> of which my share<br>is <b>\$ 180 K</b>   | Funded |
| NSF: DMR Division<br>Of Materials<br>Research                           | MRI: Acquisition of a Physical<br>Properties Measurement<br>System With 9 Tesla<br>Magnetometer (Dynacool) for<br>Research and Teaching at<br>VCU | <b>Co-PI (with<br/>PI and 3<br/>other co-PIs)</b>       | <b>09/15/17 to 08/31/20</b><br><b>Total \$281,610</b> (No specific<br>share of grant as instrument<br>is acquired as one piece).      | Funded |
| NSF: Electronic,<br>Photonic, &<br>Magnetic Devices<br>(ECCS)           | Single nanowire spin-valve<br>based infrared photodetectors<br>and equality bit comparators   | <b>Co-PI<br/>(with PI and 1<br/>co-PI from<br/>VCU)</b> | <b>08/01/16 to 07/31/19</b><br><br><b>\$375 K</b> of which my share<br>is <b>\$ 103.9 K</b>   | Funded |
| NSF: CAREER   | CAREER: Reliable and Fault<br>Tolerant Super Energy<br>Efficient Nanomagnetic<br>Computing in the Presence of<br>Thermal Noise                    | <b>PI</b>   | <b>07/13 to 06/18.</b><br><b>\$436.7K</b> over 5 years +<br><b>\$82.9 K</b> supplement (2018)<br>= Total <b>\$519.6 K</b> my<br>share | Funded |
| VCU: Quest<br>Commercialization<br>fund                                 | Energy Efficient Memory<br>Devices Based on skyrmions   | <b>PI</b>   | <b>2017-2018</b><br><br><b>\$20K for 1 year</b>   | Funded |
| VMEC: Virginia<br>Microelectronics<br>Consortium<br>SEED GRANT          | Electrical manipulation of<br>fixed magnetic skyrmions<br>without magnetic fields for<br>energy efficient memory                                  | <b>PI</b>   | <b>2017-2018</b><br><br><b>\$15K for 1 year</b>   | Funded |
|   |   |   |   |        |

### b. Grants that are completed

| Agency/<br>Mechanism  | Title  | Role   | Duration/Amount  | Status  |
|---|--|--|--|---|
| NSF:<br>Nanoelectronics<br>Beyond 2020 ECCS<br><br>With a NRI<br>supplement gift from<br>SRC (Semiconductor<br>Research<br>Corporation) | Nanoelectronics Beyond 2020:<br>Hybrid Spintronics and<br>Straintronics: A New<br>Technology for Ultra-Low<br>Energy Computing and Signal<br>Processing Beyond the Year<br>2020. | <b>Co-PI</b><br>(PI: from VCU<br>and<br>3 other co-PIs<br>from:<br>U. Mich, UVA<br>and UC<br>Riverside). | <b>09/11 to 08/17 with NCE</b><br><b>(primarily funds left for a</b><br><b>collaboration in France).</b><br>NSF: \$1.55 million total,<br>my share of this award<br>comes to<br><b>\$297 K</b> plus <b>\$9,500</b> in<br>travel supplement for a<br><b>total of \$306.5K</b> | Funded<br>Now on a<br>no cost<br>extension<br>(NCE) |

|   |  |   |  |           |
|---|--|---|--|-----------|
|   |  |   | NRI: \$ 200K total, my share of this award comes to <b>\$42K</b><br><i>Including both NSF and NRI gift my share is \$348.5K of a total of \$1.75 million</i> |           |
| NSF: Unsolicited Software Hardware Fundamentals, CCF, CISE. | SHF: Small: Pipelined and wireless ultra-low power straintronics: An acoustically clocked combinational and sequential nanomagnetic architecture | <b>PI</b><br>(one co-PI from VCU)         | <b>07/12-06/16</b><br>\$440K total, my share of this award: <b>\$202 K</b>   | Completed |
| Jefferson Laboratory (DOE Lab)                              | Magnetic shielding for "Continuous Wave Superconducting Radio Frequency System for Nuclear Materials Research"                                   | Sub-contract awardee                      | <b>3 years (2013, 2014, 2015)</b> partial graduate student support (stipend only) <b>\$44K.</b>  | Completed |
| NSF: Unsolicited Sensors and Sensing Systems CMMI           | Ultra-low power and ultra-sensitive spintronic nanowire strain sensors   | <b>PI</b><br>(with 2 co-PIs from VCU)     | <b>07/13 to 06/17 with NCE.</b><br><b>\$330 K</b> of which my share is <b>\$ 87.6 K</b>  | Completed |
| CIT: State of Virginia                                      | A Modeling and Simulation Hub for Straintronic Logic and Memory Technology, \$100,000,   | <b>Co-PI</b><br>(with <b>PI</b> from VCU) | <b>2015-2017</b> (with NCE) <b>\$100K total, my share is \$48K</b>   | Completed |
| VCU PRIP (Presidential Research Incentive Program           | Non-contact fluid injection system for medical and flow control applications   | <b>PI</b><br>(one co-PI from VCU)         | <b>07/10-06/12</b><br><b>\$50K total, my share is \$25K</b>  | Completed |

**Funding Summary:** Total awards as PI/co-PI (~ \$4.5 million) with my share (~\$1.7 million).

**PEER REVIEWED JOURNAL ARTICLES:  
PUBLISHED 72; IN-PRESS 1**

\* Indicates corresponding author      Underlined indicates my graduate student/postdoc  
Google Scholar H-index= 28 <https://scholar.google.com/citations?user=PPvWn3oAAAJ>

**JOURNAL ARTICLES ACCEPTED (1)**

**PUBLISHED JOURNAL ARTICLES (73)**

1. Pallabi Sutradhar, Shiv N. Khanna, **Jayasimha Atulasimha\***, "Magnetic Behavior of Assemblies of Interacting Cobalt-Carbide Nanoparticles", Journal of Magnetism and Magnetic Materials, **469**, 128, 2019. <https://www.sciencedirect.com/science/article/pii/S0304885318304323> (Published online).
- **2018**
2. Md. Ali Azam, Dhritiman Bhattacharya, Damien Querlioz, Jayasimha Atulasimha\*, "Resonate and Fire Neuron with Fixed Magnetic Skyrmions", *Journal of Applied Physics*, Special Issue on Neuromorphic Computation, Journal of Applied Physics **124**, 152122, 2018. <https://aip.scitation.org/doi/10.1063/1.5042308>

3. Dhritiman Bhattacharya, **Jayasimha Atulasimha\***, “Skyrmion-mediated voltage-controlled switching of ferromagnets for reliable and energy-efficient 2-terminal memory”, *ACS Applied Materials Interfaces*, **10** (20), 17455, 2018. <https://pubs.acs.org/doi/10.1021/acsami.8b02791>
4. Md Mamun Al-Rashid, Alexander Grutter, Brian Kirby, **Jayasimha Atulasimha\***, “Polarized Neutron Reflectometry Study of Depth Dependent Magnetization Variation in Co Thin Film on a PMN-PT Substrate”, *Journal of Applied Physics*, **124**, 113903, 2018. <https://aip.scitation.org/doi/10.1063/1.5037601>
5. Md. Ahsanul Abeed, **Jayasimha Atulasimha**, Supriyo Bandyopadhyay\*, “Magneto-elastic switching of magnetostrictive nanomagnets with in-plane shape anisotropy”, *Journal of Physics: Condensed Matter*, **30** (29), 2018 <http://iopscience.iop.org/article/10.1088/1361-648X/aadb6a/meta>
6. N. D'Souza, A. Biswas, H. Ahmad, M. Salehi Fashami, M. A. Al Rashid, V. Sampath, D. Bhattacharya, M. A. Abeed, **J. Atulasimha\*** and S. Bandyopadhyay\*, “Straintronics: Strain switched nanomagnets for energy efficient computing”, *Nanotechnology*, **29** (44), 2018. <http://iopscience.iop.org/article/10.1088/1361-6528/aad65d>
- **2017**
7. Dhritiman Bhattacharya, Md Mamun Al Rashid and Jayasimha Atulasimha, “Energy efficient and fast reversal of a fixed skyrmion 2-terminal memory with spin current assisted by voltage controlled magnetic anisotropy”, *Nanotechnology*, **28**, 425201, 2017. DOI <https://doi.org/10.1088/1361-6528/aa811d>
8. Daniel B. Gopman, Vimal Sampath , Hasnain Ahmad, Supriyo Bandyopadhyay, and **Jayasimha Atulasimha\***, “Static and dynamic magnetic properties of sputtered Fe-Ga thin films” *IEEE Transactions on Magnetics*, **53** (11), 2017. <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7918636>
9. Ayan Biswas, Hasnain Ahmad, **Jayasimha Atulasimha**, Supriyo Bandyopadhyay\*, “Experimental demonstration of complete 180° reversal of magnetization in isolated Co nanomagnets on a PMN-PT substrate with voltage generated strain”, *Nano Letters*, **17** (6), 3478–3484, 2017. <http://pubs.acs.org/doi/pdf/10.1021/acs.nanolett.7b00439>
10. Sanjay Sah and **Jayasimha Atulasimha\***, “Energy based model for temperature dependent behavior of ferromagnetic materials”, *Journal of Magnetism and Magnetic Materials*, 426, 654, 2017. <http://www.sciencedirect.com/science/article/pii/S0304885316328219>
11. Dhritiman Bhattacharya, Md Mamun Al-Rashid, Noel D'Souza, Supriyo Bandyopadhyay, **Jayasimha Atulasimha\***, “Incoherent magnetization dynamics in strain mediated switching of magnetostrictive nanomagnets”, *Nanotechnology* **28** 015202, 2017. <http://iopscience.iop.org/article/10.1088/0957-4484/28/1/015202/pdf>
12. Pallabi Sutradhar, Vikas Chauhan, Shiv N. Khanna, and **Jayasimha Atulasimha\***, “Magnetic Behavior of Superatom-Fullerene Assemblies” *Phys. Chem. Chem. Phys.*, **19**, 996-1002, 2017 <http://pubs.rsc.org/-/content/articlepdf/1970/cp/c6cp05196k>  
**HIGHLIGHT ON THE BACK COVER OF *Phys. Chem. Chem. Phys***

13. Md Ahsanul Abeed, Ayan Biswas, Md Mamun Al-Rashid, **Jayasimha Atulasimha**, and Supriyo Bandyopadhyay\*, Image Processing With Dipole-Coupled Nanomagnets: Noise Suppression and Edge Enhancement Detection, IEEE Transactions on Electron Devices, 64, 5, 2017.  
<http://ieeexplore.ieee.org/document/7885567/>
14. Supriyo Bandyopadhyay\*, Ayan K. Biswas, **Jayasimha Atulasimha**, “Energy-efficient hybrid spintronic-straintronic non-volatile reconfigurable equality bit comparator”, SPIN, **07**, 1750004 (2017). <http://dx.doi.org/10.1142/S2010324717500047>
15. Susmita Dey Manasi, Md Mamun Al-Rashid, **Jayasimha Atulasimha**, Supriyo Bandyopadhyay, Amit Ranjan Trivedi\*, “Skewed Straintronic Magnetotunneling- Junction-Based Ternary Content-Addressable Memory—Part I” accepted, IEEE Transactions on Electron Devices, 64, 2835, 2017, DOI: [10.1109/TED.2017.2706755](https://doi.org/10.1109/TED.2017.2706755)
16. Susmita Dey Manasi, Md Mamun Al-Rashid, **Jayasimha Atulasimha**, Supriyo Bandyopadhyay, Amit Ranjan Trivedi\*, “Skewed Straintronic Magnetotunneling- Junction-Based Ternary Content-Addressable Memory—Part II”, IEEE Transactions on Electron Devices, 64, 2842, 2017, DOI: [10.1109/TED.2017.2706744](https://doi.org/10.1109/TED.2017.2706744)
17. Andres C. Chavez, Wei-Yang Sun, **Jayasimha Atulasimha**, Kang L. Wang, and Gregory P. Carman, Voltage induced artificial ferromagnetic-antiferromagnetic ordering in synthetic multiferroics, Journal of Applied Physics 122, 224102 (2017); <https://doi.org/10.1063/1.4997612>
- **2016**
18. Noel D'Souza, Mohammad Salehi Fashami, Supriyo Bandyopadhyay and **Jayasimha Atulasimha\***, "Experimental Clocking of Nanomagnets with Strain for Ultra Low Power Boolean Logic", *Nano Letters*, **16**, 1069, 2016. [10.1021/acs.nanolett.5b04205](https://doi.org/10.1021/acs.nanolett.5b04205)  
**Highlighted in Chemical and Engineering News “The Magnetic Pull Of Ultralow-Power Computing” Feb 2, 2016,** <http://cen.acs.org/articles/94/web/2016/02/Magnetic-Pull-Ultralow-Power-Computing.html>
19. V. Sampath, N. D'Souza, D. Bhattacharya, G. M. Atkinson, S. Bandyopadhyay, **J. Atulasimha\***, “Acoustic-Wave-Induced Magnetization Switching of Magnetostrictive Nanomagnets from Single-Domain to Nonvolatile Vortex States”, *Nano Letters*, **16**, 5681, 2016.  
<http://pubs.acs.org/doi/abs/10.1021/acs.nanolett.6b02342>
20. Dhritiman Bhattacharya, Md Mamun Al-Rashid, **Jayasimha Atulasimha\*** “Voltage controlled core reversal of fixed magnetic skyrmions without a magnetic field”, *Scientific Reports*, **6**, 31272, 2016. <http://www.nature.com/articles/srep31272>  
**Highlighted in VCU School of Engineering Website** <http://www.egr.vcu.edu/news-events/switching-fixed-magnetic-skyrmions-low-power-computing/>
21. Mana Amrei, Delli Venkateshan, Noel D'Souza, **Jayasimha Atulasimha**, Hooman Tafreshi\*, "Novel Approach to Measure Droplet Detachment Force from Fibers", *Langmuir*, 32 (50), 1333, 2016. <http://pubs.acs.org/doi/pdf/10.1021/acs.langmuir.6b03198>
22. V. Sampath, N. D'Souza, G. M. Atkinson, S. Bandyopadhyay, **J. Atulasimha\***, “Experimental demonstration of acoustic wave induced magnetization switching in dipole coupled



- magnetostrictive nanomagnets for ultralow power computing”, *Appl. Phys. Lett.*, **109**, 102403, 2016. <http://dx.doi.org/10.1063/1.4962335>
23. M. Salehi-Fashami, M. Al-Rashid, Wei-Yang Sun, P. Nordeen, S. Bandyopadhyay, A.C. Chavez, G.P. Carman, **J. Atulasimha\***, “Binary information propagation in circular magnetic nanodot arrays using strain induced magnetic anisotropy”, *Nanotechnology (letter)*, **27**, 43LT01, 2016. <http://iopscience.iop.org/article/10.1088/0957-4484/27/43/43LT01/pdf>
  24. Z. Zhao, M. Jamali, N. D'Souza, D. Zhang, S. Bandyopadhyay, **J. Atulasimha**, J. P. Wang\*, “Giant Voltage Manipulation of MgO-based Magnetic Tunnel Junctions via Localized Anisotropic Strain: Pathway to Ultra-Energy-Efficient Memory Technology”, *Appl. Phys. Lett.*, **109**, 102403, 2016. <http://scitation.aip.org/content/aip/journal/apl/109/9/10.1063/1.4961670>
  25. Md Mamun Al-Rashid, Supriyo Bandyopadhyay, **Jayasimha Atulasimha\***, “Dynamic Error in Strain Induced Magnetization Reversal of Nanomagnets due to Incoherent Switching and Formation of Metastable States: A Size-dependent Study”, *IEEE Transactions on Electron Devices*, 63 (8), 3307, 2016. [10.1109/TED.2016.2582142](http://dx.doi.org/10.1109/TED.2016.2582142)
  26. Sanjay Sah, Ganapati Myneni, **Jayasimha Atulasimha\***, “Experimental Characterization of Magnetic Materials for the Magnetic Shielding of Cryomodules in Particle Accelerators”, *IEEE Transactions on Magnetics*, 52 (2), February, 2016. <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7307163>
  27. Md I Hossain, M Maksud, N K R Palapati , A Subramanian , **J Atulasimha** and S Bandyopadhyay, “Super-giant magnetoresistance at room temperature in copper nanowires due to magnetic field modulation of potential barrier heights at nanowire-contact interfaces”, *Nanotechnology (letter)*, **27**, 30LT02, 2016. <http://iopscience.iop.org/article/10.1088/0957-4484/27/30/30LT02/pdf>
  28. Mohammad Hossain, Mahjabin Maksud, Arunkumar Subramanian, **Jayasimha Atulasimha**, Supriyo Bandyopadhyay, “Strain effects on anisotropic magnetoresistance in a nanowire spin valve”, *Journal of Physics D: Applied Physics*, **49**, 455003, 2016. <http://dx.doi.org/10.1088/0022-3727/49/45/455003>.
- **2015**
29. Md Mamun Al-Rashid, Dhritiman Bhattacharya, Supriyo Bandyopadhyay, **Jayasimha Atulasimha\*** "Geometry Effects in Switching of Nanomagnets with Strain: Reliability, Energy Dissipation and Clock Speed in Dipole-Coupled Nanomagnetic Logic", *IEEE Transactions on Electron Devices*, **62**, 2978, 2015. <http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7182756>
  30. Hasnain Ahmad, **Jayasimha Atulasimha** and Supriyo Bandyopadhyay\*, “Reversible strain-induced magnetization switching in FeGa nanomagnets: Pathway to a rewritable, non-volatile, non-toggle, straintronic memory cell for extremely low energy operation”, *Scientific Reports*, 18264, 1-7, 2015. <http://www.nature.com/articles/srep18264>
  31. S. Khasanvis, M. Li, M. Rahman, A. K. Biswas, M. Salehi-Fashami, **J. Atulasimha**, S. Bandyopadhyay and C. A. Moritz, “Architecting for causal intelligence at nanoscale”, *IEEE Computer*, 48 (12), 54-64, 2015.

32. Santosh Khasanvis\*, Mingyu Li, Mostafizur Rahman, Mohammad Salehi Fashami, Ayan K. Biswas, **Jayasimha Atulasimha**, Supriyo Bandyopadhyay, and Csaba Andras Moritz, “Self-similar Magneto-electric Nanocircuit Technology for Probabilistic Inference Engines”, published online, IEEE Transactions on Nanotechnology, 2015. [10.1109/TNANO.2015.2439618](https://doi.org/10.1109/TNANO.2015.2439618)
33. Hasnain Ahmad, **Jayasimha Atulasimha** and Supriyo Bandyopadhyay, “Electric field control of magnetic states in isolated and dipole-coupled FeGa nanomagnets delineated on a PMN-PT substrate”, Nanotechnology (Fast Track Communication) , **26**, 401001, 2015. <http://iopscience.iop.org/article/10.1088/0957-4484/26/40/401001/meta> (See press at <http://nanotechweb.org/cws/article/lab/62960>)
34. Supriyo Bandyopadhyay\* and **Jayasimha Atulasimha\***, “Low-energy logic paradigms for the next decade and beyond”, published online, IEEE Nanotechnology Magazine, 2015.
35. Md. Iftexhar Hossain, Saumil Bandyopadhyay, **Jayasimha Atulasimha** and Supriyo Bandyopadhyay\*, "Modulation of D'yakonov-Perel' spin relaxation in InSb nanowires with infrared illumination at room temperature", Nanotechnology, **26** 281001, 2015. [doi:10.1088/0957-4484/26/28/281001](https://doi.org/10.1088/0957-4484/26/28/281001)
36. Ayan K. Biswas, **Jayasimha Atulasimha** and Supriyo Bandyopadhyay\*, “Straintronic spin neuron”, Nanotechnology **26**, 285201, 2015. <http://iopscience.iop.org/article/10.1088/0957-4484/26/28/285201> (See press at phys.org <http://phys.org/news/2015-07-straintronic-neuron-greatly-neural.html>)
37. Kamaram Munira\*, Souheil Nadri, Mark B. Forgues, Mohammad Salehi Fashami, **Jayasimha Atulasimha**, Supriyo Bandyopadhyay and Avik W. Ghosh, “Reducing error rates in straintronic multiferroic dipole-coupled nanomagnetic logic by pulse shaping”, *Nanotechnology* **26** 245202, 2015. <http://iopscience.iop.org/0957-4484/26/24/245202> (See press at: <http://nanotechweb.org/cws/article/lab/61470>)
- **2014**
38. Ayan K. Biswas, Supriyo Bandyopadhyay, and **Jayasimha Atulasimha**, "Complete magnetization reversal in a magnetostrictive nanomagnet with voltage-generated stress: A reliable energy-efficient non-volatile magneto-elastic memory", *Appl. Phys. Lett.* **105**, 072408 (2014). <http://dx.doi.org/10.1063/1.4893617> (See press at phys.org: <http://phys.org/news/2014-09-non-volatile-memory-energy-efficiency-magnitude.html>)
39. Saumil Bandyopadhyay, Hasnain Ahmed, **Jayasimha Atulasimha** and Supriyo Bandyopadhyay\*, "Coherent spin transport and suppression of spin relaxation in InSb nanowires at room temperature", *Small*, 2014 (Posted online: Jul 22. doi: 10.1002/sml.201401022). <http://onlinelibrary.wiley.com/doi/10.1002/sml.201401022/full> (*This work was a result of my mentoring Saumil Bandyopadhyay's high school science project*).
40. Ayan K. Biswas, **Jayasimha Atulasimha** and Supriyo Bandyopadhyay\*, "An error-resilient non-volatile magneto-elastic universal logic gate with ultralow energy-delay product", *Scientific Reports*, **4**, 7553, 2014. <http://www.nature.com/srep/2014/141223/srep07553/full/srep07553.html>
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51. Noel D'Souza\*, **Jayasimha Atulasimha**, Supriyo Bandyopadhyay, "An energy-efficient Bennett clocking scheme for 4-state multiferroic logic", *IEEE Trans. on Nanotechnology*, **11**, 418, 2012.  
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54. Noel D'Souza\*, **Jayasimha Atulasimha**, Supriyo Bandyopadhyay: "Four-state nanomagnetic logic using multiferroics", *Journal of Physics D: Applied Physics*, **44**, 265001, 2011.  
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- **2009**

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64. Supratik Datta\*, **Jayasimha Atulasimha**, Chaitanya Mudivartha and Alison B. Flatau, "Modeling of magnetomechanical actuators in laminated structures", *Journal of Intelligent Material Systems and Structures*, **20**, 1121, 2009. <http://jim.sagepub.com/content/20/9/1121.abstract>
- **2008**
65. **Jayasimha Atulasimha\***, Alison B. Flatau and James R. Cullen "Energy-based Model for Actuation and Sensing Behavior of Single-crystal Iron-gallium Alloys", *Journal of Applied Physics*, **103**, 014901, 2008. [http://jap.aip.org/resource/1/japiau/v103/i1/p014901\\_s1](http://jap.aip.org/resource/1/japiau/v103/i1/p014901_s1)
66. **Jayasimha Atulasimha\***, Alison B. Flatau, and James Cullen "Analysis of the effect of gallium content on the magnetomechanical behavior of single-crystal iron-gallium alloys using an energy-based model", *Smart Materials and Structures*, **17**, 025027, 2008. <http://iopscience.iop.org/0964-1726/17/2/025027>
67. **Jayasimha Atulasimha\***, George Akhras and Alison B. Flatau, "Comprehensive three dimensional hysteretic magnetomechanical model and its validation with experimental <110> single-crystal iron-gallium behavior", *Journal of Applied Physics*, **103**, 07B336, 2008. [http://jap.aip.org/resource/1/japiau/v103/i7/p07B336\\_s1](http://jap.aip.org/resource/1/japiau/v103/i7/p07B336_s1)
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69. Supratik Datta\*, **Jayasimha Atulasimha**, Chaitanya Mudivartha and Alison B. Flatau, "The modeling of magnetomechanical sensors in laminated structures", *Smart Materials and Structures*, **17**, 025010, 2008. <http://iopscience.iop.org/0964-1726/17/2/025010>
70. Chaitanya Mudivartha\*, Supratik Datta, **Jayasimha Atulasimha** and Alison B. Flatau, "A bidirectionally coupled magnetoelastic model and its validation using a Galfenol unimorph sensor", *Smart Materials and Structures*, **17**, 035005, 2008. <http://iopscience.iop.org/0964-1726/17/3/035005>
- **2007**
71. **Jayasimha Atulasimha\***, Alison B. Flatau, Eric Summers, "Characterization and Energy-based Model of the Magnetomechanical Behavior of Polycrystalline Iron-Gallium Alloys", *Smart Materials and Structures*, **16**, 1265, 2007. <http://iopscience.iop.org/0964-1726/16/4/039>
72. Supratik Datta\*, **Jayasimha Atulasimha** and Alison B. Flatau, "Modeling of Magnetostrictive Galfenol Sensor and Validation under Four-Point Test", *Journal of Applied Physics*, **101**, 09C521, 2007. [http://jap.aip.org/resource/1/japiau/v101/i9/p09C521\\_s1](http://jap.aip.org/resource/1/japiau/v101/i9/p09C521_s1)

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73. **Jayasimha Atulasimha\***, Alison B. Flatau and Rick A. Kellogg, “Sensing Behavior of Varied Stoichiometry Single Crystal Fe-Ga”, *Journal of Intelligent Materials Systems and Structures*, **17**, 97, 2006. <http://jim.sagepub.com/content/17/2/97.short>

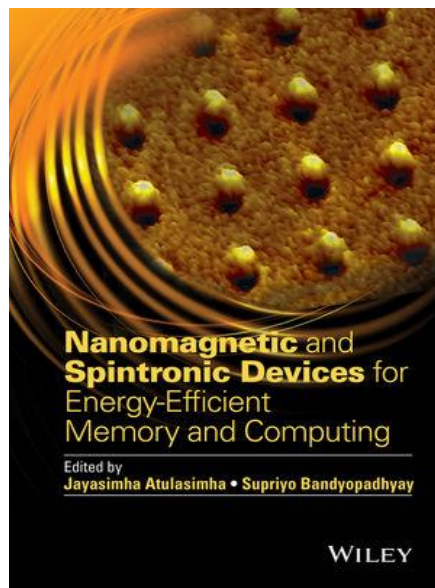
## BOOK CHAPTERS

\*Corresponding author

1. **J. Atulasimha\*** and S. Bandyopadhyay, “Hybrid spintronics and straintronics: A super energy-efficient computing paradigm based on interacting multiferroic nanomagnets” in *Spintronics in Nanoscale Devices*. Ed. Eric Robert Hedin and Yong S. Joe, Pan Stanford Publishers. Published August 2013.
2. Noel D'Souza, **Jayasimha Atulasimha\***, Supriyo Bandyopadhyay "Four-state hybrid spintronics-straintronics: Extremely low-power information processing with multiferroic nanomagnets possessing biaxial anisotropy" in *Emerging VLSI Circuits*, Editors Tomasz Wojcicki & Krzysztof Iniewski (editors) CRC press, 2015.
3. Ayan Biswas, Noel D'Souza, Supriyo Bandyopadhyay, **Jayasimha Atulasimha\***, “Chapter 9: Hybrid spintronics-straintronics”, in *Nanomagnetic and spintronics devices and phenomena for energy-efficient computing*, Wiley, New York Editors J. Atulasimha and S. Bandyopadhyay, (Published, Spring 2016).
4. **Jayasimha Atulasimha\*** and Supriyo Bandyopadhyay\*, “Chapter 1: Introduction”, in *Nanomagnetic and spintronics devices and phenomena for energy-efficient computing*, Wiley, New York Editors J. Atulasimha and S. Bandyopadhyay, (Published, Spring 2016).
5. Md. Iftexhar Hossain, Saumil Bandyopadhyay, **Jayasimha Atulasimha** and Supriyo Bandyopadhyay\*, “Coherent Spin Transport in Inorganic Semiconductor Quantum Wires”, in “Contemporary Topics in Semiconductor Spintronics”, Editors S. Bandyopadhyay, M. Cahay, J. P. Leburton, World Scientific, 2017

## BOOKS EDITED

1. Editors J. Atulasimha and S. Bandyopadhyay, "Nanomagnetic and spintronics devices and phenomena for energy-efficient computing", Wiley, New York. Published in Spring 2016.



## INVITED TALKS

### a. Invited talks given as presenting author at conferences

1. "Energy efficient computing with strain mediated voltage control of magnetism", IUTAM Symposium on Mechanics of electro/magneto-active materials and structures, Beijing, China, August, 2018.
2. "Strain and direct voltage control of magnetization in nanoscale elements for energy efficient computing" 13th International Workshop on Magnetism & Superconductivity at the Nanoscale, Coma Ruga, Spain, July, 2017.
3. "Demonstration of stress and surface acoustic wave induced magnetization switching in magnetostrictive nanomagnets for energy efficient computing", SPIE Optics + Photonics Conference, San Diego, August 2016.
4. "Energy efficient Boolean and non-Boolean computing with strain mediated switching of magnetization of nanomagnets", Joint MMM-INTERMAG, conference, San Diego, Jan, 2016.
5. "Straintronics: Energy efficient computing with magneto-elastically coupled nanomagnets", Energy, Materials and Nanotechnology conference on Ultrafast Research, Las Vegas, Nevada, Nov 16-19, 2015.
6. "Boolean and non-Boolean information processing with strain clocked nanomagnets: Ultra-low-energy Hybrid Spintronics-Straintronics" International Conference on Small Science (ICSS 2014), Hong Kong, China, 8-11, December, 2014.
7. "Hybrid Spintronics-Straintronics: Towards super energy efficient computing platforms" Darnell's Energy Summit, Richmond, Virginia, Sept 23-25 2014.
8. "Hybrid Spintronics-Straintronics: Simulations and Experiments on Ultra Energy Efficient Computing with Multiferroic Nanomagnets", International Materials Research Congress, Cancun, Mexico, August, 2014.
9. "The role of magnetostrictive materials in smart structures and its emerging applications in nanoelectronics and nanoscale strain sensing", Plenary Talk, International Conference on Emerging Materials and Applications, ICEMA 2014, Indian Institute of Technology, Roorkee (Golden Jubilee, Saharanpur Campus), India, April 5-6, 2014. (PLENARY TALK).
10. "Hybrid Spintronics-Straintronics: An extremely energy efficient strain-clocked nanomagnetic computing paradigm", IEEE Nano Materials and Devices Conference, Taiwan, October 2013.
11. "Hybrid spintronic/straintronics: A super energy efficient computing scheme based on interacting multiferroic nanomagnets", IEEE Nanotechnology Conference, Birmingham, UK, August, 2012.
12. "Hybrid Spintronics-straintronics: low power electronics with multiferroic materials", INTERMAG Conference, Vancouver, Canada, May, 2012.
13. "Ultra-low-energy hybrid spintronics and straintronics: multiferroic nanomagnets for memory, logic and ultrafast image processing " American Physical Society, March Meeting, Boston, 2012.



14. "Electrically Switchable Multiferroic Nanomagnets: A new Paradigm for Low Power Nanomagnetic Computing, Villa Conference on Interactions Among Nanostructures (VCIAN 2011), Las Vegas, NV, April, 2011.
15. "Magnetomechanical Behavior of Iron-Gallium Alloys", Materials Research Society, Fall Conference, Boston, MA, Dec 1st, 2008.
16. "Armstrong's Contribution to the Modeling of Magnetostrictive Materials" Armstrong Memorial Session, SPIE Conference on Smart Structures and Materials, San Diego, March, 2007.

**b. Invited talks given as presenting author at Universities/Research Labs/Workshops**

1. "Voltage control of nanoscale magnetism and magnetic skyrmions : application to energy efficient computing devices", invited talk given in Beijing, China: Chinese Academy of Science (Condensed Matter Physics), Aug 27<sup>th</sup>, 2018. Beihang University, Aug 30<sup>th</sup>, 2018.
2. "Voltage control of nanoscale magnetism and magnetic skyrmions : application to energy efficient computing devices", invited talk given in Mumbai (Bombay), India: Indian Institute of Technology, Bombay, Aug 20<sup>th</sup>, 2018. Tata Institute of Fundamental Research, Bombay, Aug 21<sup>st</sup>, 2018. Bhaba Atomic Research Center, Bombay, Aug 23<sup>rd</sup>, 2018.
3. "Voltage control of nanoscale magnetism: towards energy efficient non-Boolean and neuromorphic computing devices", Workshop on Spintronics and Nanomagnetism for Neuromorphic Computing, Leeds Univ., Leeds, United Kingdom, June, 2018.
4. "Energy efficient computing with voltage control of magnetism: scaling and switching error analysis", TANMS Workshop, University of California, Los Angeles, Jan 31<sup>st</sup>, 2018.
5. "Electric field control of magnetization: towards energy efficient nanomagnetic computing" Washington DC, Naval Research Laboratory, Feb 22<sup>nd</sup>, 2017.
6. "Energy efficient nanomagnetic computing with electric field control of magnetization", Los Angeles, University of California, Los Angeles, Feb 3<sup>rd</sup>, 2017.
7. "Energy efficient straintronic nanomagnetic computing: stress induced collective dynamics of spins in magnetostrictive nanomagnets in the presence of thermal noise", Dept. of Physics, VCU, Feb, 2016.
8. "Straintronics: Energy Efficient Computing with Strain Switched Nanomagnets", New York University, US-French Workshop on Nanoelectronics, September 14<sup>th</sup>, 2015.
9. "Energy efficient straintronic computing: Boolean and non-Boolean information processing with strain-mediated switching of nanomagnets with electric fields" University of Paris, Sud, June 29<sup>th</sup> 2015 and Institut Jean Lamour, Nancy, France, July 3<sup>rd</sup> 2015.
10. "Energy efficient computing and information processing with strain-mediated switching of nanomagnets with electric fields" University of Minnesota, Feb 20<sup>th</sup>, 2015.

11. "Super energy efficient straintronics-spintronics: Strain-mediated switching of nanomagnets with electric fields",  
University of Tokyo, Tokyo, Dec 11<sup>th</sup>, 2014.  
Tohoku University, Sendai, Dec 12<sup>th</sup>, 2014.  
Indian Institute of Science, Bangalore, Jan 7<sup>th</sup>, 2015.
12. "Super energy efficient straintronics-spintronics: clocking magnetostrictive nanomagnets with strain",  
Princeton University, September 5<sup>th</sup>, 2014.
13. "Hybrid Spintronics-Straintronics: An extremely energy efficient strain-clocked nanomagnetic computing paradigm", ITRI, Hsinchu, Taiwan, October 9<sup>th</sup>, 2013.
14. "Hybrid Spintronics-Straintronics: An ultra energy efficient nanomagnetic computing paradigm",  
Indian Institute of Science, Bangalore, India, June, 2013.
15. "An ultra-energy efficient approach to nanomagnetic memory and logic devices", Advanced Light Source User Workshop, Lawrence Berkeley National Lab, October 2012.
16. "Multiferroic straintronics: Ultra-low power computing and image processing", Army Research Lab, Adelphi, MD, Dec 12<sup>th</sup> 2011.
17. "Straintronics: Ultra low-power computing with multiferroic nanomagnets", University of Virginia, September 13<sup>th</sup>, 2011.
18. "Ultra low-power computing with multiferroic nanomagnets", National Institute of Standards and Technology (NIST), July 21<sup>st</sup>, 2011.
19. "Role of Magnetostrictive Iron-Gallium in Smart Structures and Microsystems"  
Indian Institute of Science, Bangalore, India, September 2007.  
Arizona State University, Phoenix/Tempe, AZ, USA, March 2007.  
Clarkson University, Potsdam, NY, USA, February 2007.
20. "Role of Magnetostrictive Materials in Smart Structures"  
Hindustan Aerospace Limited (HAL), Bangalore, India, January 2005.  
National Aerospace Laboratory (NAL), Bangalore, India, January 2005.

**c. Invited talks by my senior PhD students/postdoctoral fellows representing my group**

21. Invited Workshop/Tutorial on "Straintronics: Energy Efficient Nanomagnetic Computing" (Presented by Md. Mamun Al-Rashid), IEEE Nanotechnology Conference, Pittsburgh, PA, July, 2017.
22. Dhritiman Bhattacharya (presenter), Md Mamun Al-Rashid, Jayasimha Atulasimha, "Energy efficient switching of fixed magnetic skyrmions with an electric field for nanomagnetic computing devices", SPINTRONICS X, SPIE Nanoscience +engineering conference, San Diego, August 2017.

**d. Invited talks as a co-author**

23. S. Bandyopadhyay (*presenting author*) and J. Atulasimha, "Straintronics: Strain Switched multiferroic nanomagnets for extremely low energy logic/memory", IEEE Nanotechnology Materials and Devices Conference (NMDC), Alaska, September, 2015.

24. S. Bandyopadhyay (*presenting author*) and J. Atulasimha, "Hybrid spintronics and straintronics: An ultra-energy efficient nanomagnetic computing architecture", International Conference on Communications, Devices and Intelligent Systems, Calcutta, India, 2012. (*Plenary talk*)
25. S. Bandyopadhyay(*presenting author*) and J. Atulasimha, "Hybrid spintronics and straintronics: an ultralow energy computing paradigm to extend Moore's law beyond the year 2020", Device Research Conference, Pennsylvania State University, June 2012.

## CONFERENCE PRESENTATIONS: (Total 64, Published proceedings 15, abstract only 49)

### CONFERENCE PRESENTATIONS WITH PROCEEDINGS (not peer reviewed)

#### \* Presenting author

1. Noel D'Souza\*, Jayasimha Atulasimha and Supriyo Bandyopadhyay, "Four state straintronics: Extremely low power nanomagnetic logic using multiferroic with biaxial anisotropy", **Best student paper award for symposium on multifunctional materials**, Proceedings of the ASME 2011 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, SMASIS2011, September 18-21, 2011, Phoenix, Arizona, USA.
2. Yezuo Wang\*, Jayasimha Atulasimha, "A dexterous surgical manipulation tool using self-sensing magnetoelectric actuators", Proceedings of ASME 2010 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, SMASIS 2010, October, 2010, Philadelphia, PA, USA.
3. Yezuo Wang\*, Jayasimha Atulasimha, Joshua Clarke Vishnu, Baba Sundaresan, "SS10-SSN04-46: Thickness ratio effects on quasistatic actuation and sensing behavior of laminate Magnetoelectric cantilevers", Proceedings of SPIE Smart Structures/NDE 2010 7-11 March 2010, San Diego, CA, USA.
4. Jayasimha Atulasimha\*, Yezuo Wang, Vishnu Baba Sundaresan, "SMASIS2009-1351 Magnetoelectric Cantilever for Collocated Actuation and Sensing Applications: Experimental Study, Model and Scaling Laws", Proceedings of ASME 2009 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, SMASIS 2009 September 21 - 23, 2009, Oxnard, California, USA.
5. Jayasimha Atulasimha\*, J. Xie, M. Richeson, K.M.Mossi, "SMASIS2009-1371: Pyroelectric Materials: Scaling of Output Power with Dimensions and Substrate Clamping", Proceedings of the ASME 2009 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, SMASIS2009, September 20-24, 2009, Oxnard, California, USA.
6. Vishnu Baba Sundaresan\* and Jayasimha Atulasimha, "SMASIS2009-1350: Characterization of Magnetoelectric Cantilever for use as an Ablation Tool in Minimally Invasive Surgery", Proceedings of ASME 2009 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, SMASIS 2009 September 21 - 23, 2009, Oxnard, California, USA.
7. Michael Stuebner\*, Jayasimha Atulasimha, Ralph C. Smith "Frequency Response of Piezoelectric and Magnetostrictive Hysteretic Nonlinear System", Proceedings of SMASIS08 2008 ASME 2008 Conference on Smart Materials, Adaptive Structures and Intelligent Systems October 28-30, 2008, Ellicott City, MD, USA.
8. S. Datta, J. Atulasimha, C. Mudivartha and A. B. Flatau\* "Stress and magnetic field dependent Young's modulus in single crystal iron-gallium alloys", Proceedings of 19th International Conference on Adaptive Structures Technologies (ICAST), Switzerland, Oct 6-9, 2008.

9. Chaitanya Mudivartha\*, Supratik Datta, Jayasimha Atulasimha, Alison B. Flatau, Phillip Evans, and Marcelo Dapino "Equivalence of magnetoelastic, elastic, and mechanical work energies with stress-induced anisotropy and its use in the Armstrong model for magnetostriction" Proceedings of SPIE Conference on Smart Structures and Materials, San Diego, March, 2008.
10. Jayasimha Atulasimha\* and Alison B. Flatau, "A generalized model for the behavior of magneto-electric composites", Proceedings of SPIE Conference on Smart Structures and Materials, San Diego, March, 2007.
11. Jayasimha Atulasimha\* and Alison B. Flatau, "Energy-based Model for the Magnetostrictive behavior of Polycrystalline Iron-Gallium alloys", Proceedings of the SPIE Conference on Smart Structures and Materials, San Diego, March, 2006.
12. Jayasimha Atulasimha\* and Alison B. Flatau, "Energy-based constitutive Model for Magnetostrictive Materials and its application to Iron-gallium alloys", Proceedings of the 49<sup>th</sup> MRS Fall Symposium, Boston, Dec 2005.
13. Jayasimha Atulasimha\* and Alison B. Flatau, "Quasistatic Actuation Characteristics of Varied Stoichiometry Single Crystal Iron-Gallium", Proceedings of the 5<sup>th</sup> International Conference on Adaptive Structures Technologies (ICAST), Bar Harbor, Maine, October 2004.
14. Jayasimha Atulasimha\*, Alison B. Flatau, Inderjit Chopra and Rick A. Kellogg, "Effect of Stoichiometry on Sensing Behavior of Iron-Gallium", Proceedings of the SPIE Conference on Smart Structures and Materials, San Diego, March, 2004. (**Best student paper award**).
15. Jayasimha Atulasimha\* and Inderjit Chopra "Torsional Behavior of Shape Memory Alloys", Proceedings of the AIAA/ASME/AHS Conference on Structural Dynamics and Materials (SDM), Norfolk, April 2003.

ASME-American Society of Mechanical Engineers  
SIAM-Society of Industrial and Applied Mathematics  
SPIE-The International Society of Optical Engineering  
MRS- Materials Research Society

## CONFERENCE PRESENTATIONS/POSTERS WITH ABSTRACT ONLY

### \* Presenting author

1. D. Bhattacharya\*, P. Sutradhar and J. Atulasimha, "Switching error analysis in skyrmion mediated VCMA switching", International Conference on Magnetism, San Francisco, CA, July, 2018. (Talk and abstract only).
2. M. Azam, D. Bhattacharya, D. Querlioz and J. Atulasimha, "Fixed Skyrmion Based Resonate and Fire Neuron", International Conference on Magnetism, San Francisco, CA, July, 2018. (Poster and abstract only).
3. D. Bhattacharya\*, and J. Atulasimha, "Robust Pathway for Voltage Controlled Switching of Ferromagnets Via an Intermediate Skyrmion State", American Physical Society, March Meeting, Los Angeles, USA, 2018. (Talk and abstract only).

4. M. A. Azam, D. Bhattacharya\*, D. Querlioz, and J. Atulasimha, “Fixed Magnetic Skyrmion Based Resonate and Fire Neurons”, American Physical Society, March Meeting, Los Angeles, USA, 2018. (Poster and abstract only).
5. M. Al-Rashid, B. Kirby\*, and J. Atulasimha, “Strain Induced Depth Dependent Magnetization Variation in Co thin films on PMN-PT Studied Using Polarized Neutron Reflectometry (PNR)”, American Physical Society, March Meeting, Los Angeles, USA, 2018. (Talk and abstract only).
6. M. Al-Rashid\*, B. Kirby, and J. Atulasimha, “Polarized Neutron Reflectometry Study of Strain Induced Magnetization Variation along the Thickness of Co Thin Films on a PMN-PT Substrate”, 62<sup>nd</sup> Annual Conference on Magnetism and Magnetic Materials, New Orleans, Louisiana, November, 2017. (Talk and abstract only).
7. J. Atulasimha\*, D. Bhattacharya, Md. M. Al-Rashid, P. Sutradhar, “Magnetostrictive Materials, Electrical Control of Magnetism and Nanoelectronics”, ASME SMASIS Conference, Snowbird, Utah, Sept 18-20, 2017. (Talk and abstract only).
8. D. Bhattacharya, M. Al-Rashid\* and J. Atulasimha, “Switching fixed skyrmions with electrical field in the presence of thermal noise”, American Physical Society, March Meeting, Baltimore, USA, 2017. (Talk and abstract only).
9. P. Sutradhar\*, V. Chauhan, S. Khanna and J. Atulasimha, “Modeling of Magnetic Behavior of Superatomic-Fullerene Assemblies”, American Physical Society, March Meeting, Baltimore, USA, 2017. (Talk and abstract only).
10. M. Al-Rashid\*, M. Maqableh, B. Stadler and J. Atulasimha, “Current induced incoherent magnetization dynamics in ferromagnetic/non-magnetic metallic multilayer nanowires”, American Physical Society, March Meeting, Baltimore, USA, 2017. (Talk and abstract only).
11. Pallabi Sutradhar\*, Shiv Khanna and Jayasimha Atulasimha, “Magnetic Response of Cobalt--Carbide Nanoparticles with large Magnetocrystalline Anisotropy”, American Physical Society, March Meeting, Baltimore, USA, 2017. (Talk and abstract only).
12. D. Bhattacharya\*, M. Al-Rashid and J. Atulasimha, “Voltage controlled reversal of fixed magnetic skyrmions”, 61<sup>st</sup> Annual Conference on Magnetism and Magnetic Materials, New Orleans, Louisiana, November, 2016. (Talk and abstract only).
13. M. Al-Rashid\*, M. Maqableh, B. Stadler and J. Atulasimha, “Micromagnetic Modeling and Optimization of Co/Cu Multilayered Nanowire STT-MRAM”, 61<sup>st</sup> Annual Conference on Magnetism and Magnetic Materials, New Orleans, Louisiana, November, 2016. (Talk and abstract only).
14. M. Al-Rashid\*, M. Salehi-Fashami, W. Sun, P. Nordeen, A. Chavez, S. Bandyopadhyay, G. Carman and J. Atulasimha, “Strain Assisted Logic Propagation in Scalable Circular Magnetic Nanodot Wire”, 61<sup>st</sup> Annual Conference on Magnetism and Magnetic Materials, New Orleans, Louisiana, November, 2016. (Talk and abstract only).
15. Dhritiman Bhattacharya, Md Mamun Al-Rashid, Jayasimha Atulasimha\*, “Magnetoelectric switching: Reversing fixed magnetic skyrmions with an electric field”, ASME SMASIS Conference, Stowe, Vermont, Sept 28-30, 2016. (Talk and abstract only).
16. Vimal Sampath, Noel D'Souza, Dhritiman Bhattacharya, Gary Atkinson, Supriyo Bandyopadhyay, Jayasimha Atulasimha\*, “Experimental demonstration of acoustic wave based

- manipulation of magnetic states of magnetostrictive nanomagnets for low power computing”, ASME SMASIS Conference, Stowe, Vermont, Sept 28-30, 2016. (Talk and abstract only).
17. Dhritiman Bhattacharya\*, Md Mamun Al-Rashid, Jayasimha Atulasimha, “An energy efficient memory device based on fixed magnetic skyrmions switched with an electric field”, Device Research Conference, June 2016. (Poster and abstract only).
  18. Pallabi Sutradhar, Vikas Chauhan, Shiv Khanna and Jayasimha Atulasimha\*, “Model for temperature dependent ferromagnetic behavior of metal cluster-fullerene superatomic solids”, International Conference on Fine Particle Magnetism, NIST, USA, June, 2016. (Talk and abstract only).
  19. Pallabi Sutradhar\*, Vikas Chauhan, Shiv Khanna and Jayasimha Atulasimha, “Model for ferromagnetic behavior of metal cluster-fullerene superatomic solids”, American Physical Society, March Meeting, Baltimore, USA, 2016. (Talk and abstract only).
  20. Mohammad Salehi-Fashami\*, Md Mamun Al-Rashid, Wei-Yang Sun, Paul Nordeen, Supriyo Bandyopadhyay, Gregory Carman, Jayasimha Atulasimha, “Magneto-electric control of magnetization in a chain of circular nanomagnets as new paradigm for ultra-low power binary information propagation”, American Physical Society, March Meeting, Baltimore, USA, 2016. (Talk and abstract only).
  21. Vimal Sampath\*, Dhritiman Bhattacharya, Noel D'Souza, Supriyo Bandyopadhyay, Jayasimha Atulasimha, “Experimental manipulation of magnetic states of magnetostrictive nanomagnets using surface acoustic waves”, American Physical Society, March Meeting, Baltimore, USA, 2016. (Talk and abstract only).
  22. Dhritiman Bhattacharya\*, Md Mamun Al-Rashid, Vimal Sampath, Noel D'Souza, Supriyo Bandyopadhyay, Jayasimha Atulasimha, “Incoherent stress-mediated magnetization reversal in shape anisotropic multiferroic nanomagnets”, American Physical Society, March Meeting, Baltimore, USA, 2016. (Talk and abstract only).
  23. Md Iftekhar Hossain\*, Saumil Bandyopadhyay, Jayasimha Atulasimha, Supriyo Bandyopadhyay “Modulating Spin Relaxation with Light and a Novel Spintronic Room Temperature Infrared Photodetector”, American Physical Society, March Meeting, Baltimore, USA, 2016. (Talk and abstract only).
  24. Hasnain Ahmad\*, Jayasimha Atulasimha, Supriyo Bandyopadhyay “Electric field controlled strain induced reversible switching of magnetization in Galferol nanomagnets delineated on PMN-PT substrate”, American Physical Society, March Meeting, Baltimore, USA, 2016. (Talk and abstract only).
  25. Z. Zhao\*, M. Jamali, N.M. D'Souza, D. Zhang, S. Bandyopadhyay, J. Atulasimha and J. Wang, “Giant Voltage Manipulation of MgO Magnetic Tunnel Junctions via Localized Anisotropic Piezostrain”, Joint MMM-INTERMAG, conference, San Diego, Jan, 2016. (Poster and abstract only).
  26. A.C. Chavez\*, W. Sun, J. Atulasimha and G. Carman, “Voltage Induced Switching from Parallel to Antiparallel Magnetization Ordering in Artificial Multiferroics”, Joint MMM-INTERMAG, conference, San Diego, Jan, 2016. (Poster and abstract only).
  27. Sanjay Sah, Mechanical and Jayasimha Atulasimha\*, “Energy Based Model for Ferromagnetic Materials: From Cryogenic to Room Temperature” ASME SMASIS, Colorado Springs, CO, September, 2015. (Talk and abstract only).



28. Md Mamun\* Al-Rashid, Supriyo Bandyopadhyay, Jayasimha Atulasimha, "Stochastic simulations of switching error in magneto elastic and spin-Hall effect based switching of nanomagnetic devices", American Physical Society, March Meeting, San Antonio, USA, 2015. (Talk and abstract only).
29. Vimal Sampath\*, Noel D'Souza, Supriyo Bandyopadhyay, Jayasimha Atulasimha, "Preliminary experiments on SAW based magnetization switching of nanomagnets", American Physical Society, March Meeting, San Antonio, USA, 2015. (Talk and abstract only).
30. Ayan K Biswas\*, Md Mamun Al-Rashid, Jayasimha Atulasimha, Supriyo Bandyopadhyay, "Magneto-elastic artificial neurons with extremely low energy dissipation", American Physical Society, March Meeting, San Antonio, USA, 2015. (Talk and abstract only).
31. N.M. D'Souza\*, M. Salehi Fashami, S. Bandyopadhyay and J. Atulasimha, "Achieving Boolean Logic and Information Propagation in Multiferroic Nanomagnets through Straintronics", Magnetism and Magnetic Materials (MMM) Conference, Honolulu, Hawaii, Nov 3-7, 2014. (Talk and abstract only).
32. Noel D'Souza, Mohammad Salehi Fashami, Supriyo Bandyopadhyay and Jaysimha Atulasimha\*, "Experimental demonstration of straintronic nanomagnetic logic for ultralow power computing" ASME SMASIS, Newport, PI, September, 2014. (Talk and abstract only).
33. Md Mamun Al-Rashid\*, Supriyo Bandyopadhyay and Jayasimha Atulasimha, "Effect of device geometry on clocking speed and switching probability for energy-efficient multiferroic nanomagnetic logic: A quantitative study", ASME SMASIS, Newport, PI, September, 2014. (Talk and abstract only).
34. Jayasimha Atulasimha\* and Supriyo Bandyopadhyay, "Hybrid Straintronics and Spintronics: An ultra-energy-efficient route to Boolean and non-Boolean information processing", CMOS Emerging Technologies Symposium, CEA-MINATEC, Grenoble, France, July, 2014. (Talk and abstract only).
35. Noel D'Souza, Mohammad Salehi Fashami, Supriyo Bandyopadhyay and Jayasimha Atulasimha\*, "Strain clocked nanomagnetic memory and information processing devices: Simulations and Experimental progress towards ultra-energy efficient Hybrid Spintronics-Straintronics", NANOARC, Paris, France, July 2014. (Talk and abstract only).
36. Noel D'Souza\*, Mohammad Salehi Fashami, Supriyo Bandyopadhyay and Jayasimha Atulasimha, "Late News: Experimental demonstration of strain-clocked Boolean Nanomagnetic Logic and Information Propagation", Device Research Conference, Santa Barbara, June, 2014. (Poster and abstract only).
37. Noel D'Souza\*, Mohammad Salehi Fashami, Supriyo Bandyopadhyay and Jayasimha Atulasimha, "Hybrid Spintronics-Straintronic Nanomagnetic Logic with Two-State Elliptical and Four-State Concave Magnetostrictive Nanomagnets", Device Research Conference, Santa Barbara, June, 2014. (Poster and abstract only).
38. Mohammad Salehi Fashami\*, Supriyo Bandyopadhyay, Jayasimha Atulasimha, "Ultra low-power hybrid spintronics-straintronics clocked with Surface Acoustic Waves (SAW)", American Physical Society, March Meeting, Denver, USA, 2014. (Talk and abstract only).
39. Noel D'Souza\*, Mohammad Salehi Fashami, Supriyo Bandyopadhyay, Jayasimha Atulasimha "Experiments on straintronic nanomagnetic logic with two-state elliptical and four-state diamond and concave magnetostrictive nanomagnets" American Physical Society, March Meeting, Denver, USA, 2014. (Talk and abstract only).

40. Sanjay Sah\*, Ganapati Myneni, Jayasimha Atulasimha, "Magnetic Materials Characterization and Modeling for Magnetic Shielding of Cryomodules in Particle Accelerators" American Nuclear Society Conference, American Nuclear Society Conference, Dec 2013.
41. Sudipta Dutta\*, Jayasimha Atulasimha, M.S. Bobji, Arindam Ghosh, "Correlated domain wall motion in frustrated dipole coupled nanowire system: a magnetic force microscopy and magneto resistance study" International Union of Materials Research Society - ICA Conference, Indian Institute of Science, Bangalore, India, December, 2013
42. Jayasimha Atulasimha\*, "Adaptive Structures Prize Talk: Magnetostrictive materials in smart structures, nanoscale strain sensing and nanoelectronics" ASME SMASIS 2013, September 16-18, 2013, Snow Bird, UT. (Talk and abstract only).
43. Noel D'Souza, Mohammad Salehi Fashami, Supriyo Bandyopadhyay, Jayasimha Atulasima\*, "Two state and four-state multiferroic nanomagnetic logic devices for super energy-efficient computing", ASME SMASIS 2013, September 16-18, 2013, Snow Bird, UT. (Talk and abstract only).
44. Noel D'Souza\*, Mohammad Salehi-Fashami, Kamaram Munira, Avik W. Ghosh, Supriyo Bandyopadhyay Jayasimha Atulasimha, "Multiferroic nanomagnetic logic: ultra low-power hybrid spintronics-straintronics" SPIE Optics and Photonics Conference, August 25-29, 2013. (Poster and abstract only).
45. Noel D'Souza\*, Mohammad Salehi-Fashami, Supriyo Bandyopadhyay Jayasimha Atulasimha, "Experimental realization of straintronic nanomagnetic logic using strain-induced magnetization switching in magnetostrictive nanomagnets elastically coupled to PMN-PT", American Physical Society, March Meeting, Baltimore, USA, 2013. (Talk and abstract only).
46. Mohammad Salehi-Fashami\*, Noel D'Souza, Jayasimha Atulasimha and Supriyo Bandyopadhyay, "Implications of stochastic magnetization dynamics on reliability of dipole coupled nanomagnetic logic", American Physical Society, March Meeting, Baltimore, USA, 2013. (Talk and abstract only).
47. Noel D'Souza, Mohammad Salehi Fashami, Jaysimha Atulasimha\*, Kuntal Roy and Supriyo Bandyopadhyay, "Preliminary experiments on multiferroic nanomagnetic logic devices for ultralow power computing", ASME SMASIS2012, September 19-21, 2012, Stone Mountain, GA. (Talk and abstract only).
48. Noel D'Souza\*, Jayasimha Atulasimha and Supriyo Bandyopadhyay, "Four-state straintronics: Ultra low-power collective nanomagnetic computing using multiferroics with biaxial anisotropy", American Physical Society, March Meeting, Boston, USA, 2012. (Talk and abstract only).
49. Mohammad Salehi-Fashami\*, Jayasimha Atulasimha and Supriyo Bandyopadhyay, "Ultra low-power straintronics with multiferroic nanomagnets: magnetization dynamics, universal logic gates and associated energy dissipation", American Physical Society, March Meeting, Boston, USA, 2012. (Talk and abstract only).
50. Kuntal Roy\*, Supriyo Bandyopadhyay and Jayasimha Atulasimha, " Hybrid spintronics and straintronics: A paradigm for ultra-low-energy computing ", American Physical Society, March Meeting, Boston, USA, 2012. (Talk and abstract only).
51. Kamaram Munira\*, Supriyo Bandyopadhyay, Jayasimha Atulasimha Eugene Chen and Avik W. Ghosh, "Reliable switching in MRAM and multiferroic logic", American Physical Society, March Meeting, Boston, USA, 2012. (Talk and abstract only).

52. Jayasimha Atulasimha\* and Supriyo Bandyopadhyay, "Ultra Low-power Computing with Multiferroic Nanomagnets", SPIE Smart Structures/NDE 2012, San Diego, CA, USA, March 2012. (Talk and abstract only).
53. Jayasimha Atulasimha\* and Supriyo Bandyopadhyay, "Ultrasensitive low-power multifunctional spintronic nanowire sensors for magnetic field, pressure, and strain sensing ", SPIE Smart Structures/NDE 2011, San Diego, CA, USA, March 2011 (Talk and abstract only).
54. S. Datta\*, J. Atulasimha, C. Mudivartha and A. B. Flatau, "Effect of stress and magnetic field on the Young's modulus of single crystal iron-gallium alloys", AIAA Region I YPSE, November 21, 2008. (Talk and abstract only).
55. Jayasimha Atulasimha and Ralph Smith\*, "Magnetostriuctive Controller with an Inverse-Materials, Compensator for Milling Applications", SIAM Conference on Mathematical Aspects of Materials, Philadelphia, May, 2008. (Talk and abstract only).
56. Jayasimha Atulasimha\* and Alison B. Flatau, "Experimental Characterization and Free Energy Model for Single Crystal Iron-Gallium Alloy Actuators", 49<sup>th</sup> Magnetism and Magnetic Materials Conference, Jacksonville, Florida, November 2004. (Talk and abstract only).

## **WORKSHOP/WEBINAR PRESENTATIONS**

1. ONR Workshop on Transducers at Penn State: Couple of years from 2004-2006, 2010
2. Galfenol (pre-MURI) Workshop at UMD: Couple of years from 2004-2006.
3. Webinar on Hybrid Spintronics Straintronics for the NRI (Nanoscale Research Initiative of the Semiconductor Research Corporation), February 2012 and August 2015.
4. NRI review meeting in Gaithersburg, Maryland, Oct, 2012, 2014, 2015.
5. Government Workshop on MTJs, College Park, Maryland, Oct 6-7, 2016, Straintronics: Switching nanomagnets with electrically generated strain for energy efficient computing.

## **INTELLECTUAL PROPERTY GENERATION**

### **US Patents (3 granted)**

1. United States Patent no. 8,602,034 (application number US 12/889,857) and titled MAGNETOELECTRIC SURGICAL TOOLS FOR MINIMALLY INVASIVE SURGERY, Vishnu Baba Sunderasen, *Jayasimha Atulasimha* and Josh Clarke. (GRANTED)
2. United States Patent no. 8,921,962 (application number US 13/447,431) and titled "PLANAR MULTIFERROIC/MAGNETOSTRICTIVE NANOSTRUCTURES AS MEMORY ELEMENTS, TWO-STAGE LOGIC GATES AND FOUR-STATE LOGIC ELEMENTS FOR INFORMATION PROCESSING" *Jayasimha Atulasimha* and Supriyo Bandyopadhyay. (GRANTED)
3. United States Patent no. 9,379,162 (application number US 14/546,393) and titled MAGNETO-ELASTIC NON-VOLATILE MULTIFERROIC LOGIC AND MEMORY WITH ULTRALOW ENERGY DISSIPATION Ayan Biswas, Supriyo Bandyopadhyay and *Jayasimha Atulasimha*. (GRANTED)

### **PCT and US Patent filed (under review)**

4. Title: Switching skyrmions with an electric field for memory, computing and information processing, *Jayasimha Atulasimha*, Dhritiman Bhattacharya, Md Mamun Al-Rashid, Provisional assigned USSN 62/301,749, accorded a filing date of March 1, 2016. International Application Number: PCT/US2017/020148

Nationalization of PCT, i.e. US Patent filed on August 31<sup>st</sup>, 2018, Application number: 16081553

### **Invention Disclosures (that were not converted to patents)**

1. Title: An Ultrasensitive Spintronic Strain Sensor  
Inventors: Supriyo Bandyopadhyay and *Jayasimha Atulasimha*. Assigned: April 2<sup>nd</sup>, 2010.
2. Title: Nanowire magnetic field sensor based on contact barrier modulation by a magnetic field  
Supriyo Bandyopadhyay, Arunkumar Subramanian, *Jayasimha Atulasimha*, Md. Iftekhar Hossain, Mahjabin Maksud and Naveen Palapati. Assigned: May, 2016.

### 3. TEACHING/MENTORING EXPERIENCE

#### COURSES TAUGHT

##### REGULAR COURSES AT VCU

##### UNDERGRADUATE

1. EGRM 410 Mechatronics: Senior Mechanical Engineering Undergraduate course with lab taught at Virginia Commonwealth University (VCU): Fall 2008, 2009, 2010, 2011.
2. ENGR 201: Dynamics and Kinematics Fall 2012, 2013, Spring 2013, Fall 2014, Fall 2018.
3. ENGR 315: Process Systems Dynamics, Spring 2014, 2015, 2016, 2017, 2018.

##### GRADUATE/SENIOR TECHNICAL ELECTIVE

4. EGRM 555 Smart Materials: Mechanical Engineering Graduate course/ Senior Elective taught at Virginia Commonwealth University (VCU): Spring 2010, 2011, 2016.
5. EGRM 691 Advanced Materials (cross listed as EGRM 591 Advanced Material Properties) taught at Virginia Commonwealth University (VCU): Spring 2012.
6. EGRM 691 Advanced Materials/Mechanical and Nuclear Engineering Materials taught at Virginia Commonwealth University (VCU): Spring 2013.
7. EGRM 691 Nanomagnetism and Nanomagnetic Devices taught at Virginia Commonwealth University (VCU): Fall 2015, 2017.

##### INDEPENDENT STUDY AT VCU

8. EGRM 691 Energy Harvesting: Special Topics course for graduate students, VCU Fall 2008.

##### REGULAR UNDERGRADUATE COURSE AT NCSU

9. Calculus-3: Vector Calculus, Surface and Volume Integrals, for Sophomores NCSU, Spring 2008.

#### SENIOR DESIGN PROJECTS AT VCU

- Design and Fabrication of a Remote Controlled Aircraft, Undergraduate Senior Design, 2008, 09, 10, 11, 12, 13, 14, 15. A variant: VTOL RC-Aircraft offered in 2016-17.
- Radar Cross Section (RCS) of Unmanned Air Vehicles (UAVs), 2017-18.
- Fabrication of SAW device to switch magnetostrictive nanomagnets, 2013-14.
- Design of an autonomous quad-copter with GPS navigation, 2012-13.
- Design and Characterization of a Pressure Chamber for Needle-less Medicine Injection, 2011 (with Dr. Tafreshi). **This project won the Sternheimer Senior Design Grant.**

## MENTORING ACTIVITY

### POSTDOCTORAL ADVISING AT VCU (1 postdoctoral fellow)

1. Dr. Noel D'Souza,  
August 2014- 2015, Postdoctoral Fellow with Prof. Atulasimha  
January 2016- August 2016, Research Associate (partly funded by Prof. Hadimani and Prof. Atulasimha);  
Currently at Intel Corp., Portland.

### DOCTORAL ADVISING AT VCU

#### PhDs graduated (5)

| Name/Level                      | Research Area/Thesis Title  | First employment after graduation  |
|---------------------------------|---|--|
| 1. Mohammad Salehi Fashami/PhD  | Two-state Hybrid Spintronics-Straintronic Logic with Multiferroic Nanomagnets                             | Completed PhD in Spring 2014, postdoctoral fellow at Univ. of Delaware (2014-16) and Stony Brook Univ. (2016-18), currently at Intel Corp., Portland). |
| 2. Noel D'Souza/PhD             | 4-state Hybrid Spintronics-Straintronic and Experimental Demonstration of Multiferroic Nanomagnetic Logic | Completed PhD in Summer 2014, postdoctoral fellow VCU (2014-16) and Penn State Univ. (2016-18) currently at Intel Corp., Portland.                     |
| 3. Sanjay Sah/PhD               | Magnetic shielding for particle accelerator applications  | Completed PhD in Spring 2016<br>Worked in GE Hitachi Nuclear Energy (2016-18) currently at Intel Corp., Portland).                                     |
| 4. Vimal Ganapathy Sampath /PhD | Acoustic clocking of nanomagnetic logic   | Completed PhD in 2016, Currently at Intel Corp., Portland  |
| 5. Md. Mamun Al-Rashid/PhD      | Incoherent magnetization switching in nanomagnetic devices  | Completed PhD in 2017, Currently at Intel Corp., Portland  |

#### Current PhDs that defended or expected to defend in the next ~ 1year

| Name/Level                    | Research Area/Thesis Title                      | Expected graduation |
|-------------------------------|---|---------------------|
| 6. Dhitriman Bhattacharya/PhD | Low power nanomagnetic computing with Skyrmions | Summer, 2019        |

#### Current PhDs that will take 2 or more years to graduate

| Name/Level          | Research Area/Thesis Title                                 | Expected graduation |
|---------------------|--|---------------------|
| 7. Md. Ali Azam/PhD | Neuromorphic computing with voltage controlled nanomagnets | Summer, 2020        |
| 8. Austin Roe/PhD   | SAW assisted STT RAM devices                               | Summer, 2021        |
| 9. Mahadi Rajib/PhD | TBA  | Summer, 2022        |
| 10. Walid Al-Misba  | Expected to transfer by Spring 2019                        | Summer, 2022        |



### **UNDERGRADUATE STUDENT INTERNS IN MY LAB AT VCU**

UG=undergraduate, MNE=Mechanical and Nuclear Engineering, KGP=Kharagpur

| <b>Name/Level</b>   | <b>Research Area</b>   | <b>Publications</b>       |
|---|--|---------------------------|
| R. Prasoon, IIT-KGP exchange program                      | Experimental work on multiferroics   | 1 journal in print        |
| Henry Huang, MNE, VCU                                     | Built robot for my Mechatronics course                                     | N/A                       |
| Thomas Wittenschlaeger /UG MNE, VCU                       | Experimental characterization of frequency dependent multiferroic behavior | N/A                       |
| Michael Hahn, MNE, VCU                                    | Buckling of magnetostrictive plates/<br>Also developed my webpage          | N/A                       |
| Saumil Bandyopadhyay, Maggie Walker High School, Richmond | Room temperature spin transport and manipulation in nanowires              | 2 journal papers in print |
| Andrew Richardson/ Adarsha Sapkota, MNE, VCU              | Webpage development/work on design building and testing electromagnets     | N/A                       |

### **MS/PhD THESIS COMMITTEE MEMBERSHIP**

#### **PhD Committees**

1. Ender Dur (VCU Mechanical Engineering, 2011).
2. Cabir Turan, (VCU Mechanical Engineering, 2011)
3. Mevlut Fatih Peker (VCU Mechanical Engineering, 2012)
4. Kuntal Roy (VCU Electrical and Computer Engineering, 2012)
5. Hao Zhang (VCU Mechanical and Nuclear Engineering, 2013)
6. Santosh Khasanvis (U. Massachusetts, Amherst, Electrical Engineering 2015)
7. Raghavendra Joshi, National Inst. of Tech., Surathkal, India, Mechanical Engineering, 2015)
8. Ayan K. Biswas (PhD in Electrical Engineering and Computer, 2016)
9. Iftekar Hossain (PhD in Electrical and Computer Engineering, 2016)
10. Hasnanin Ahmed (PhD in Electrical and Computer Engineering, 2016)
11. Murtadha A. Shaheen (PhD in Mechanical and Nuclear Engineering, 2016)
12. Mana Mokhtabad Amrei (PhD in Mechanical and Nuclear Engineering, 2016)
13. Corell Moore (PhD in Mechanical and Nuclear Engineering, 2018)
14. Syeda Farheen (PhD in Mechanical and Nuclear Engineering, 2018)
15. Delli Ganesh Venkateshan (PhD in Mechanical and Nuclear Engineering, 2018)

#### **MS Committees**

16. Jingsi Xie, VCU Mechanical Engineering, 2010.
17. Thomas Cranes, VCU Electrical and Computer Engineering, 2014.
18. Joel D. Elmore, VCU Electrical and Computer Engineering, 2015.

## **4. PROFESSIONAL SERVICE**

### **A. SERVICE AT VCU**

#### **University**

- Faculty senate alternate (Fall 2011- 2013).
- Guest speaker in a NSF CAREER mentoring workshop in Nov, 2013 and Nov, 2015.

#### **School of Engineering/University**

- Participated in the SOE summer discovery program, 2009 and 2010.
- Advisory committee chair for Virginia Microelectronics Center (VMC), 2015-current
- Advisory committee chair for Nano characterization Core Facility (NCC), 2015-current
- SOE Research Convergence Council, 2018-current

#### **Department of Mechanical and Nuclear Engineering**

- 3 department level committees: Faculty recruitment 2010-2011, 2012-2013, 2018.
- Mechatronics laboratory upgrade committee, 2012.
- Serve on the Mechanical Engineering Graduate Program Committee (Fall 2010-current).
- Served as a MNE Qualifier examiner 2014-2015, 2017-18.
- Typically advise ~10-12 undergraduate students every year.
- P&T committees (1 each for promotion to associate professor with tenure and professor).
- 2 mid-tenure review committees

### **B. SERVICE AT PROFESSIONAL ORGANIZATIONS**

#### **Work Related to ASME Adaptive Structures and Material Systems (ASMS) Tech. Committee**

1. ASME Adaptive Structures and Material Systems (ASMS Branch) Technical Committee: member, since Sept 2009.  
Active Materials and/or Multifunctional Materials Technical Committee (under ASMS Branch): member: 2012-current; co-chair: 2016-17; chair 2017-18.
2. Symposium Co-organizer: Active Behavior and Mechanics Symposium, ASME SMASIS 2015.
3. Symposium Organizer: Active Behavior and Mechanics Symposium, ASME SMASIS 2016, 2017 (Sessions encompass various smart materials such as SMA, piezoelectric, magnetostrictive, multiferroic and electro-active polymer materials).
4. Session Chair/Co-Chair responsibility:
  - a. ASME 20008, 2009, 2010, 2012, 2014, 2015, 2016  
Conference on Smart Materials, Adaptive Structures and Intelligent Systems.
  - b. SPIE 2010, 2012 Conference on Smart Structures.
5. Judging Responsibility:
  - Best Journal Paper Award, 2011, 2013 ASME Adaptive Struct. and Material Systems Tech Committee
  - Smart Materials, SPIE 2011 and SMASIS, ASME 2010, 2012, 2013 student paper competitions.
6. Student activity: Student trip to the Baltimore aquarium, ASME 2008 SMASIS Conference.

#### **Work Related to Device Research Conference (DRC) Technical Program Committee**

- Member DRC Technical Program Committee: Dec 2013- Dec 2016 (DRC 2014, 2015, 2016)
- Session chair: 2015

#### **Work Related to American Physical Society (APS), Topical Group on Magnetism (GMAG)**

- Co-organizer of the focused topic: Magnetic Nanostructures: Materials and Phenomena, March Meeting, 2015.
- Co-organizer of the focused topic: Frustrated Magnetism, March Meeting, 2016.
- Session chair: 2015

#### **Work Related to IEEE Nanotechnology Council: Spintronics Technical committee**

- Review of conference papers for NMDC and IEEE Nano conferences.
- Spintronics TC Chair (June 2017-current)

### **Work Related to IEEE Magnetics Society**

- Symposium organizer and Session Chair/co-chair: ICM (International Conference on Magnetism), San Francisco, 2018

### **Work related to other societies**

- Session Chair/co-chair: MRS (Materials Research Society) 2008.
- Conference Program Committee: International program committee for NSTSI Conference, India 2011, cosponsored by IEEE Nanotechnology Council.

## **C. TECHNICAL SERVICE FOR JOURNALS/PUBLISHERS/GRANT REVIEW, ETC**

### Reviewer for journals:

Reviewed ~55 manuscripts for ~23 journals in the last 9 years. This is on an average of about 6 papers a year.

1. Nature
2. Physical Review Letters
3. Nanotechnology
4. Scientific Reports (Nature Publishing Group)
5. Proceedings of the IEEE
6. Applied Physics Letters
7. Journal of Applied Physics
8. Europhysics Letters
9. IEEE Electron Devices Letters (EDL)
10. Smart Materials and Structures
11. Journal of Magnetism and Magnetic Materials
12. J. of Intelligent Materials and Smart Structures
13. J. Physics: Condensed Matter
14. J. Phys D: Appl. Phys.
15. IEEE Transaction on Electron Devices
16. IEEE Transactions on Magnetics
17. IEEE Transactions on Very Large Scale Integration Systems
18. Sensors and Actuators A: Physical
19. Int. J. of Smart and Nano Materials
20. Microelectronics Journal
21. Finite Elements in Analysis and Design
22. Materials Today
23. Sensors

### Reviewer for Proposals

Reviewed for NSF, CMMI, 2012, 2014.

Reviewed for NSF, CISE, 2013, 2014, 2015, 2016.

Reviewed for NSF, ECCS, 2014, 2017.

Reviewed for NSF, OISE, 2015.

Reviewed for ARO, 2014, 2018.

Reviewed for the Israel Science Foundation, 2013.

Fund for Scientific Research – FNRS, Belgium, 2018.

University of Wisconsin, Madison, Research Foundation, 2014.

Engineering PRQF proposals, VCU (Internal review), 2013.

### Reviewer for Conferences:

1. Reviewed 2 papers for Materials Research Society Fall Meeting, December 2008.
2. Reviewed 6 papers for NSTSI Conference, India 2011, cosponsored by IEEE Nanotechnology Council.

3. Reviewed 1-2 papers each for IEEE Nanotechnology Council's NMDC, 2015 and IEEE Nano, 2016
4. Reviewed 1 paper for INTERMAG Conference, Vancouver 2012, cosponsored by IEEE Magnetics Society.

## **D. OTHER WORKSHOP/GOVERNMENT PANELS ORGANIZATION**

**Co-Organizer** (with 5 others), 6<sup>th</sup> US Government Working Group meeting on Magnetic tunnel junctions (MTJs), National Science Foundation, Alexandria, VA, September 14, 2018

## **E. OTHER EDUCATIONAL OUTREACH**

1. Hosted a hands-on workshop for 30-40 students on energy harvesting and nanomagnetic computing
  - a. "Charging your i-phone while walking: Energy Harvesting", Nov 2010.
  - b. "Nanomagnets for computing", July 2011 and Dec 2012 (with the support of the MATH-SCIENCE Innovation Center in Richmond, VA).
  - c. "Nanomagnets for computing", July 2013 (with support of Math Science center, hosted a work shop that included a package for building gates and using them to design a half-adder).
  - d. "Nanomagnetic computing", September 2014, Virtual lecture and demonstration on nanomagnetic devices with support of the Math Science center.
  - e. "Atomic Origins of Magnetism", June 2017, Teaching ~30 high school students the magnetism basics and using clay models of electron orbits around atoms progressively "filled" with electrons to explain atomic origin of magnetism.
2. Judge for the Junior (2011) and Senior (2012) Physics Category at Metro Richmond Science Fair.  
Judge for the ISEF (Intel Science and Engineering Fair) category, Virginia Science Fair, March 2013.  
Screener for Physics, Metro Richmond Science Fair (MRSF), Feb, 2017.
3. Mentor for the following K-12 projects:
  - a. Saumil Bandopadhyay's Metro Richmond Science/ISEF (Intel Science and Engineering Fair) and high school mentorship project, "Unitary rotation of flying qubits in a nanowire via the Hanle effect: Towards a solid state quantum computer."
  - b. Afnan Inayat's high school mentorship project on use of interfering SAW to switch nanomagnets.
4. RAPME (Richmond Area Program for Minorities in Engineering):
  - a. Summer 2011, Mentored Adeola Adesuyi to work on ~100nm star shaped Ni nanomagnets grown by e-beam lithography followed by Ni deposition.
  - b. Summer 2012, Mentored Naveen Kotha on nanofabrication.
  - c. Summer 2013, Mentored 4 students on nanofabrication and visualization of nanomagnets.
  - d. Summer 2014, Mentored 3 students on nanofabrication and visualization of nanomagnets.
  - e. Summer 2015, Mentored 3 students on nanofabrication and visualization of nanomagnets.
  - f. Summer 2018, Mentor 2 students on nanofabrication and visualization of nanomagnets.