

Ahmedullah Aziz


Assistant Professor


Dept. of Electrical Engineering & Computer Science

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Research Interests

- Complex oxide electronics
- Neuromorphic/Brain-inspired Computing
- Ultra-low power digital VLSI design
- Design automation for emerging technologies
- Non-volatile memories, Cross-point array
- Post-CMOS technologies

Education

- PhD, Electrical & Computer Engineering Summer '19
Purdue University, West Lafayette, IN, USA
 Dissertation: *Device-Circuit Co-design Employing Phase Transition Materials for Low Power Electronics.*
Advisor : Prof. Sumeet Gupta
- Master of Science, Electrical Engineering Summer '16
Pennsylvania State University, University Park, PA, USA
- Bachelor of Science, Electrical & Electronic Engineering Spring '13
Bangladesh Univ. of Engineering & Technology, Dhaka, Bangladesh

Work Experience

- **Assistant Professor (Tenure-track)** Aug '19 - present
 Dept. of Electrical Engineering & Computer Science
The University of Tennessee, Knoxville
- **Graduate Research Assistant** Jan '18 - Jul '19
Integrated Circuits & Devices' Lab, **Purdue University**, WL, IN, USA
Sponsor: SRC/NIST-nCORE (NEWLIMITS Center), DARPA
- **Co-Op Engineer (Intern)** May '17 - Oct '17
Technology Research Division, **GlobalFoundries**, FAB 8, Malta, NY, USA
Primary Manager: Dr. Srinivasa Banna, Fellow & Director of Technology Research, GlobalFoundries
- **Graduate Research Assistant** Aug '14 - Dec '17
Integrated Circuits & Devices' Lab, **Pennsylvania State University**, UP, PA, USA
Sponsor: SRC-GRC, SRC/DARPA-STARnet (LEAST Center)
- **Software Engineer** Apr '13 - Jun '14
Tizen Lab, **Samsung R&D Institute**, Dhaka, Bangladesh
Primary Manager: Dr. Nam Kyu Lee, Vice President, Samsung Electronics

Awards & Honors

- [2020] **European Design and Automation Association (EDAA) Outstanding Dissertation Award:**
Category: New directions in logic, physical design and CAD for analog/mixed-signal, Nano-scale and emerging technologies. (Monetary award and recognition)
- [2019] **Outstanding Graduate Student Research Award:** Monetary award and recognition from *College of Engineering, Purdue University* for excellence in graduate level research.
- [2019] **SIGDA Travel Grant (DAC):** Sponsored by ACM Special Interest Group on Design Automation To participate in the PhD forum of *DAC 2019* in Las Vegas, NV, USA.
- [2019] **SIGDA Travel Grant (DATE):** Sponsored by ACM Special Interest Group on Design Automation To participate in the PhD forum of *DATE 2019* in Florence, Italy.
- [2016] **Best Publication Award:** SRC/DARPA sponsored STARnet LEAST Center.
Paper Title: Phase-transition-FET Exhibiting Steep Switching Slope of 8mV/decade and 36% Enhanced ON Current.
- [2015] **Best Publication Award:** SRC/DARPA sponsored STARnet LEAST Center.
Paper Title: A steep slope transistor based on abrupt electronic phase transition.
- [2013] **Icon Award:** Monetary award with certificate presented by Samsung R&D Institute, in recognition of excellence in innovation and research progress.
- [2013] **Best Project Award:** Project Exhibition by Center for Natural Science & Engineering Research (CNSER), held as a sub-session of [International Conference on Informatics, Electronics & Vision](#).
- [2013] **Champion:** *Robi- Prothom Alo* Global Robotics Challenge (GRC).
- [2013] **Travel Grant:** To participate in [Techkriti '13](#) (Asia's Largest Technical & Entrepreneurial Festival), held in IIT Kanpur, India.
- [2013] **Runner Up:** National Electronic Project Exhibition & Competition (NEPEC), arranged by East-West University, Dhaka, Bangladesh.
- [2012] **Champion:** EEE Project Show, Organized by Bangladesh Univ. of Engineering & Technology.
- [2012] **Second Runner Up:** Software Project Show, [Inter University Tech Fiesta](#), Khulna University of Engineering & Technology, Khulna, Bangladesh.
- [2011] **Chairman's Award:** Monetary award by *Janata Bank*, Bangladesh for academic excellence.
- [2011] **Runner Up:** *Genius Hunt* (Inter university project competition), Organizer: North South University (NSU), Dhaka, Bangladesh.
- [2011] **Country Topper (Bangladesh) & Top 100 in World Ranking:** Team Name: *Day Dreamers*, [IEEEExtreme Programming Competition 5](#).
- [2009] **Dean's Award:** Monetary award from the office of the Dean, Bangladesh University of Engineering & Technology. Awarded each year based on academic performance.
- [2008] **Education Board Scholarship (Grade A):** Awarded by the ministry of education, Bangladesh to the **top 0.1%** students in the country.
- [2007] **Sunrise Star Award:** For being among the top 10 in a nationwide exam (in Bangladesh) on science.
- [2007] **Gold Medal:** Received '*Janata Bank Gold Medal*' for outstanding result in Secondary School Certificate (SSC) exam.
- [2005] **Government Scholarship & 5 Years of Full Free Studentship:** Awarded by govt. of Bangladesh to **top 1%** students in entire country.

Publications

Google Scholar : <https://scholar.google.com/citations?user=T57WOKEAAAAJ&hl=en&oi=ao>

Book Chapters:

- [B1] A. Aziz, S. K. Thirumala, D. Wang, S. George, X. Li, S. Datta, V. Narayanan and S. K. Gupta, "Sensing in Ferroelectric Memories and Flip-Flops", In: Ghosh S. (eds) 'Sensing of Non-Volatile Memory Demystified'; *Springer Nature*, **2018**. DOI: https://doi.org/10.1007/978-3-319-97347-0_3
- [B2] X. Li, M. S. Kim, S. George, A. Aziz, M. Jerry, N. Shukla, J. Sampson, S. Gupta, S. Datta, and V. Narayanan, "Emerging Steep-Slope Devices and Circuits: Opportunities and Challenges", In: Topaloglu, Rasit O., Wong, H.-S. Philip (eds) 'Beyond-CMOS Technologies for Next Generation Computer Design'; *Springer, Cham*, **2018**. DOI: 10.1007/978-3-319-90385-9_6

Patent:

- [P1] S. K Gupta, A. Aziz, N. Shukla, S. Datta, X. Li, V. Narayanan, "Low Power Sense Amplifier Based on Phase Transition Material", *U.S. Patent* (US20170352394A1), December 2017.

Ph.D. Dissertation:

- [D1] A. Aziz, "Device-Circuit Co-Design Employing Phase Transition Materials for Low Power Electronics". figshare, 12-Aug-2019 [Online]. DOI: <https://doi.org/10.25394/PGS.8982722.v1>

Journal Papers (Reversed Chronological Order):

- [J1] S. Alam, M. A. Jahangir and A. Aziz, "A Compact Model for Superconductor-Insulator-Superconductor (SIS) Josephson Junction", *under review* in *IEEE Electron Device Letters*, submitted-March 2020.
- [J2] Z. Shen, S. R. Srinivasa, A. Aziz, S. Datta, V. Narayanan and S. K. Gupta, "SRAMs and DRAMs with Separate Read-Write Ports Augmented by Phase Transition Materials", in *IEEE Transactions on Electron Devices*, vol. 66, no. 2, pp. 929-937, Feb. 2019.
- [J3] A. Aziz and S. K. Gupta, "Threshold Switch Augmented STT MRAM: Design Space Analysis and Device-Circuit Co-Design," in *IEEE Transactions on Electron Devices*, vol. 65, no. 12, Dec. 2018.
- [J4] X. Li, S. George, Y. Liang, K. Ma, K. Ni, A. Aziz, S. K. Gupta, J. Sampson, M. F. Chang, Y. Liu, H. Yang, S. Datta and V. Narayanan, "Lowering Area Overheads for FeFET-Based Energy-Efficient Nonvolatile Flip-Flops", in *IEEE Transactions on Electron Devices*, vol. 65, no. 6, June 2018.
- [J5] S. George, X. Li, M. J. Liao, K. Ma, S. Srinivasa, K. Mohan, A. Aziz, J. Sampson, S. K. Gupta and V. Narayanan, "Symmetric 2-D-Memory Access to Multidimensional Data", in *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, vol. 26, no. 6, pp. 1040-1050, June 2018.
- [J6] A. Aziz, N. Shukla, S. Datta and S. K. Gupta, "Steep Switching Hybrid Phase Transition FETs (Hyper-FET) for Low Power Applications: A Device-Circuit Co-design Perspective-Part I", in *IEEE Transactions on Electron Devices*, vol. 64, no. 3, pp. 1350-1357, March 2017.

- [J7] **A. Aziz**, N. Shukla, S. Datta and S. K. Gupta, "Steep Switching Hybrid Phase Transition FETs (Hyper-FET) for Low Power Applications: A Device-Circuit Co-design Perspective-Part II", in *IEEE Transactions on Electron Devices*, vol. 64, no. 3, pp. 1358-1365, March 2017.
- [J8] S. Gupta, M. Steiner, **A. Aziz**, V. Narayanan, S. Datta and S. K. Gupta, "Device-Circuit Analysis of Ferroelectric FETs for Low-Power Logic", in *IEEE Transactions on Electron Devices*, vol. 64, no. 8, Aug. 2017.
- [J9] X. Li, S. George, K. Ma, W. Y. Tsai, **A. Aziz**, J. Sampson, S. Gupta, M. F. Chang, Y. Liu, S. Datta and V. Narayanan, "Advancing Nonvolatile Computing with Nonvolatile NCFET Latches and Flip-Flops", in *IEEE Transactions on Circuits and Systems I: Regular Papers*, vol. 64, no. 11, Nov. 2017.
- [J10] X. Li, J. Sampson, A. Khan, K. Ma, S. George, **A. Aziz**, S. Gupta, S. Salahuddin, M. F. Chang, S. Datta and V. Narayanan, "Enabling Energy-Efficient Nonvolatile Computing with Negative Capacitance FET", in *IEEE Transactions on Electron Devices*, vol. 64, no. 8, pp. 3452-3458, Aug. 2017.
- [J11] **A. Aziz**, N. Jao, S. Datta and S. K. Gupta, "Analysis of Functional Oxide Based Selectors for Cross-Point Memories", in *IEEE Transactions on Circuits and Systems I: Regular Papers*, vol. 63, no. 12, pp. 2222-2235, Dec. 2016.
- [J12] S. Srinivasa, **A. Aziz**, N. Shukla, X. Li, J. Sampson, S. Datta, J.P. Kulkarni, V. Narayanan, S.K. Gupta, "Correlated Material Enhanced SRAMs With Robust Low Power Operation", in *IEEE Transactions on Electron Devices*, vol. 63, no. 12, pp. 4744-4752, Dec. 2016.
- [J13] **A. Aziz**, S. Ghosh, S. Datta and S. K. Gupta, "Physics-Based Circuit-Compatible SPICE Model for Ferroelectric Transistors", in *IEEE Electron Device Letters*, vol. 37, no. 6, pp. 805-808, June 2016.
- [J14] **A. Aziz** and S. K. Gupta, "Hybrid Multiplexing (HYM) for Read- and Area-Optimized MRAMs With Separate Read-Write Paths", in *IEEE Transactions on Nanotechnology*, vol. 15, no. 3, May 2016.
- [J15] N. Shukla, A. V. Thathachary, A. Agrawal, H. Paik, **A. Aziz**, D. G. Schlom, S. K. Gupta, R. E. Herbert and S. Datta, "A steep-slope transistor based on abrupt electronic phase transition", *Nature Communications*, vol. 6, Article number: 7812, Aug. 2015.
- [J16] **A. Aziz**, M. S. Hossain and M. Rahman, "Programming and Construction of AHMEDULLAHBOT- A Fast Grid-solving Robot", in *International Journal of Information Technology, Control and Automation*, Vol. 3, no. 1, January 2013.
- [J17] M. S. Hossain, **A. Aziz** and M. Rahman, "RAFI- A Stereo Vision Based Autonomous Mobile Area Mapping Robot with 16 DOF", in *International Journal of Artificial Intelligence & Applications*, Vol. 4, no. 1, January 2013.
- [J18] M.S. Hossain, S. Khan, **A. Aziz**, M. Rahman and M. A. Arafat, "Effect of Gate Dielectric on Ballistic Transport of Cylindrical Carbon Nanotube MOSFET", in *ECS Transactions*, vol. 53, no. 1, 2013.
- [J19] M. S. Hossain, **A. Aziz** and M. Rahman, "Unsupervised Object Matching and Categorization via Agglomerative Correspondence Clustering", in *Signal & Image Processing: An International Journal*, Vol. 4, No. 1, 2013.
- [J20] M.S. Hossain, S.U.Z. Khan, **A. Aziz**, M. A. Arafat, Q.D.M. Khosru, "Size Dependent Transport of Surrounding Gate Carbon Nanotube Field Effect Transistor", in *ECS Journal of Solid State Science and Technology*, vol. 2, no. 9, M23-M27, June 2013.

Conference Papers (Reversed Chronological Order):

- [C1] **A. Aziz** and K. Roy, "Insulator-Metal Transition Material Based Artificial Neurons: A Design Perspective", *21st International Symposium on Quality Electronic Design (ISQED)*, Santa Clara, CA, 2020, (presented on March 26th, will appear online soon).
- [C2] **A. Aziz**, R. Engel-Herbert, S. K. Gupta and N. Shukla, "A Three-Terminal Edge-Triggered Mott Switch", *2018 76th Device Research Conference (DRC)*, Santa Barbara, CA, 2018, pp. 1-2.
- [C3] **A. Aziz**, N. Shukla, A. Seabaugh, S. Datta and S. Gupta, "Cockcroft-Walton Multiplier based on Unipolar Ag/HfO₂/Pt Threshold Switch", *2018 76th Device Research Conference (DRC)*, Santa Barbara, CA, 2018, pp. 1-2.
- [C4] **A. Aziz**, E. T. Breyer, A. Chen, X. Chen, S. Datta, S. K. Gupta, M. Hoffmann, X. S. Hu, A. Lonescu, M. Jerry, T. Mikolajick, H. Mulaosmanovic, K. Ni, M. Niemier, I. O'Connor, A. Saha, S. Slesazek, S. K. Thirumala and X. Yin, "Computing with ferroelectric FETs: Devices, models, systems, and applications", *2018 Design, Automation & Test in Europe Conference & Exhibition (DATE)*, Dresden, Germany, 2018, pp. 1289-1298.
- [C5] M. Jerry*, **A. Aziz***, K. Ni, S. Datta, S. K. Gupta and N. Shukla, "A Threshold Switch Augmented Hybrid-FeFET (H-FeFET) with Enhanced Read Distinguishability and Reduced Programming Voltage for Non-Volatile Memory Applications", *IEEE Symposium on VLSI Tech. & Circuits*, Hawaii, USA, 2018. [* *Equal Contribution*]
- [C6] **A. Aziz**, N. Jao, S. Datta, V. Narayanan and S. K. Gupta, "A computationally efficient compact model for leakage in cross-point array", *2017 International Conference on Simulation of Semiconductor Processes and Devices (SISPAD)*, Kamakura, Japan, 2017, pp. 141-144.
- [C7] **A. Aziz** and S. K. Gupta, "Read-enhanced spin memories augmented by phase transition materials", *2017 IEEE 60th International Midwest Symposium on Circuits and Systems (MWSCAS)*, Boston, MA, USA, 2017, pp. 993-996. **[Invited]**
- [C8] **A. Aziz**, X. Li, N. Shukla, S. Datta, M. F. Chang, V. Narayanan and S. K. Gupta, "Low power current sense amplifier based on phase transition material", *2017 75th Annual Device Research Conference (DRC)*, South Bend, IN, USA, 2017, pp. 1-2.
- [C9] Z. Krivokapic, **A. Aziz**, D. Song, U. Rana, R. Galatage and S. Banna, "NCFET: Opportunities & challenges for advanced technology nodes," *2017 Fifth Berkeley Symposium on Energy Efficient Electronic Systems & Steep Transistors Workshop (E3S)*, Berkeley, CA, USA, 2017, pp. 1-3.
- [C10] Z. Krivokapic, U. Rana, R. Galatage, A. Razavieh, **A. Aziz**, J. Liu, J. Shi, H. J. Kim, R. Sporer, C. Serrao, A. Busquet, P. Polakowski, J. Muller, W. Kleemeier, A. Jacob, D. Brown, A. Knorr, R. Carter and S. Banna, "14nm Ferroelectric FinFET Technology with Steep Subthreshold Slope for Ultra Low Power Applications", *2017 IEEE Intl. Electron Devices Meeting (IEDM)*, CA, USA, 2017.
- [C11] P. Sharma, K. Tapily, A. K. Saha, J. Zhang, A. Shaughnessy, **A. Aziz**, G. Snider, S. Gupta, R. D. Clark and S. Datta, "Impact of total and partial dipole switching on the switching slope of gate-last negative capacitance FETs with ferroelectric hafnium zirconium oxide gate stack", *2017 Symposium on VLSI Technology*, Kyoto, Japan, 2017, pp. T154-T155.
- [C12] S. K. Gupta, D. Wang, S. George, **A. Aziz**, X. Li, S. Datta and V. Narayanan, "Harnessing Ferroelectrics for Non-volatile Memories and Logic", *International Symposium on Quality Electronic Design*, 2017, Santa Clara, CA, USA. **[Invited]**

- [C13] S. George, **A. Aziz**, X. Li, M. S. Kim, J. Sampson, S. Datta, S. K. Gupta, V. Narayanan, "Device – Circuit Co Design of FEFET Based Logic for Low Voltage Processors", *IEEE Computer Society Annual Symposium on VLSI (ISVLSI)*, 2016, USA.
- [C14] **A. Aziz**, S. Ghosh, S. K. Gupta and S. Datta, "Polarization charge and coercive field dependent performance of negative capacitance FETs", *2016 74th Annual Device Research Conference*, 2016.
- [C15] J. Frougier, N. Shukla, D. Deng, M. Jerry, **A. Aziz**, L. Liu, G. Lavallee, T. S. Mayer, S. Gupta and S. Datta, "Phase-transition-FET Exhibiting Steep Switching Slope of 8mV/decade and 36% Enhanced ON Current", *2016 IEEE Symposium on VLSI Technology*, Honolulu, HI, 2016, pp. 1-2.
- [C16] N. Shukla, B. Grisafe, R. K. Ghosh, N. Jao, **A. Aziz**, J. Frougier, M. Jerry, S. Sonde, S. Rouvimov, T. Orlova, S. Gupta and S. Datta, "Ag/HfO₂ based Threshold Switch with Extreme Non-Linearity for Unipolar Cross-Point Memory and Steep-slope Phase-FETs", *2016 IEEE International Electron Devices Meeting (IEDM)*, San Francisco, CA, 2016, pp. 34.6.1-34.6.4.
- [C17] S. k Gupta, **A. Aziz**, N. Shukla and S. Datta, et al, "On the Potential of Correlated Materials in the Design of Spin-based Cross-point Memories (Invited)", *IEEE International Symposium on Circuits and Systems (ISCAS)*, 2016, Montreal, Canada. **[Invited]**
- [C18] S. George, K. Ma, **A. Aziz**, X. Li, A. Khan, S. Salahuddin, M. F. Chang, S. Datta, J. Sampson, S. Gupta and V. Narayanan, "Nonvolatile Memory Design Based on Ferroelectric FETs", *2016 53rd ACM/EDAC/IEEE Design Automation Conference (DAC)*, Austin, TX, 2016, pp. 1-6.
- [C19] D. Wang, S. George, **A. Aziz**, S. Datta, V. Narayanan and S. K. Gupta, "Ferroelectric Transistor Based Non-Volatile Flip-Flop", *International Symposium on Low Power Electronics and Design (ISLPED)*, 2016, San Francisco, USA.
- [C20] **A. Aziz**, N. Shukla, S. Datta and S. K. Gupta, "Implication of hysteretic selector device on the biasing scheme of a cross-point memory array", *2015 International Conference on Simulation of Semiconductor Processes and Devices (SISPAD)*, Washington, DC, 2015, pp. 425-428.
- [C21] **A. Aziz**, N. Shukla, S. Datta and S. K. Gupta, "COAST: Correlated material assisted STT MRAMs for optimized read operation", *Intl. Sym. on Low Power Electronics and Design (ISLPED)*, 2015.
- [C22] **A. Aziz**, N. Shukla, S. Datta and S. K. Gupta, "Read optimized MRAM with separate read-write paths based on concerted operation of magnetic tunnel junction with correlated material," *2015 73rd Annual Device Research Conference (DRC)*, Columbus, OH, 2015, pp. 43-44.
- [C23] **A. Aziz**, W. Cane-Wissing, M. S. Kim, S. Datta, V. Narayanan and S. K. Gupta, "Single-Ended and Differential MRAMs Based on Spin Hall Effect: A Layout-Aware Design Perspective," *2015 IEEE Computer Society Annual Symposium on VLSI*, Montpellier, 2015, pp. 333-338.
- [C24] S. George, **A. Aziz**, X. Li, J. Sampson, S. Datta, S. Gupta and V. Narayanan, "NCFET based logic for energy harvesting systems", *SRC TECHCON*, Austin, TX, USA, September 2015.
- [C25] M. Rahman, M. Uddin, **A. Aziz**, T. Mustofa, Z. H. Mahmood, T. Soga and S. M. Mominuzzaman, "Characterization of electrodeposited multiwall carbon nanotube films on silicon substrates," *8th International Conference on Electrical and Computer Engineering*, Dhaka, 2014, pp. 373-376.
- [C26] M. W. Rahman, M. S. Hossain, **A. Aziz** and F. M. Mohammady, "Prospect of decentralized hybrid power generation in Bangladesh using biomass, solar PV & wind," *2014 3rd International Conference on the Developments in Renewable Energy Technology (ICDRET)*, Dhaka, 2014, pp. 1-6.

- [C27] M. Hossain, S. Khan, **A. Aziz** and M. W. Rahman, "Effect of temperature on ballistic transport of cylindrical (10, 0) CNTFET," *2013 IEEE International Conference of Electron Devices and Solid-state Circuits*, Hong Kong, 2013, pp. 1-2.
- [C28] M. S. Hossain, A. M. Kabir, P. Mazumder, **A. Aziz**, M. Hassan and M. Z. Baten, "Long distance appliance control using mobile Short Messaging Service and internet in parallel," *2012 International Conference on Informatics, Electronics & Vision (ICIEV)*, Dhaka, 2012, pp. 281-285.
- [C29] M. S. Hossain, A. M. Kabir, P. Mazumder, **A. Aziz**, M. Hassan, M. A. Islam and P. K. Saha, "Design and Development of an Y4 Copter Control System," *2012 UKSim 14th International Conference on Computer Modelling and Simulation*, Cambridge, UK, 2012, pp. 251-256.
- [C30] **A. Aziz** and M. S. Hossain, "Inherent Inter-vehicle Signaling Using Radio Frequency and Infra-red Communication", *2012 UKSim 14th International Conference on Computer Modelling and Simulation*, Cambridge, UK, 2012, pp. 211-215.

Talks & Presentations

Conference Talks (Recent):

- [2020] **Artificial Intelligence for Robust Engineering & Science (AIRES)**, Oak Ridge National Lab, USA.
Title: *Reliability Concerns in Emerging Neuromorphic Hardware.*
- [2020] **21st International Symposium on Quality Electronic Design (ISQED)**, Santa Clara, CA, USA.
Title: *Insulator-Metal Transition Material Based Artificial Neurons: A Design Perspective.*
- [2018] **76th Device Research Conference (DRC)**, University of California, Santa Barbara, CA, USA.
Title: *A Three Terminal Edge-Triggered Mott Switch.*
- [2017] **Intl. Conf. on Simulation of Semiconductor Processes & Devices (SISPAD)**, Kamakura, Japan.
Title: *A Computationally Efficient Compact Model for Leakage in Cross-point Array.*
- [2017] **SRC (Semiconductor Research Corporation) TECHCON**, Austin, TX, USA.
Title: *Exploiting Phase Transition Materials for Power- & Area-efficient Sense Amplifier.*
- [2017] **60th Intl. Midwest Symp. on Circuits and Systems (MWSCAS)**, Boston, MA, USA.
Title: *Read-Enhanced Spin Memories Augmented by Phase Transition Materials.*
- [2016] **Intl. Symposium on Low Power Electronics and Design (ISLPED)**, San Francisco, CA, USA.
Title: *Ferroelectric Transistor Based Non-Volatile Flip-Flop.*
- [2016] **75th Device Research Conference (DRC)**, University of Delaware, DE, USA.
Title: *Polarization Charge and Coercive Field Dependent Performance of Negative Capacitance FETs.*
- [2015] **74th Device Research Conference (DRC)**, Ohio State University, OH, USA.
Title: *Read Optimized MRAM with Separate Read-Write Paths based on Concerted Operation of Magnetic Tunnel Junction with Correlated Material.*

Poster Presentations (Recent):

- [2019] **Design Automation Conference (DAC) - Ph.D. Forum**, Las Vegas, NV, USA.
Title: *Device-Circuit Co-design Employing Phase Transition Materials for Low Power Applications*
- [2019] **Design, Automation and Test in Europe (DATE) Conference- Ph.D. Forum**, Florence, Italy.

- Title: *Device-Circuit Co-design Employing Phase Transition Materials for Low Power Applications*
- [2019] **SRC nCORE (Nanoelectronic Computing Research) Review**, University of Notre Dame, IN, USA.
Title: *Modeling and Benchmarking of TMD FETs and RRAMs.*
- [2018] **Student Research Symposium**, Purdue University, IN, USA.
Title: *Harnessing Unipolar Threshold Switches for Enhanced Rectification.*
- [2018] **76th Device Research Conference (DRC)**, University of California, Santa Barbara, CA, USA.
Title: *Cockcroft-Walton Multiplier based on Unipolar Ag/HfO₂/Pt Threshold Switch.*
- [2017] **75th Device Research Conference (DRC)**, University of Notre Dame, IN, USA.
Title: *Low Power Current Sense Amplifier Based on Phase Transition Material.*
- [2017] **GLOBALFOUNDRIES Capstone Event**, Fab8, Malta, NY, USA.
Title: *NCFET for Ultra Low Power Applications: Device-Circuit Co-design Perspective.*
- [2017] **SRC (Semiconductor Research Corporation) TECHCON**, Austin, TX, USA.
Title: *Exploiting Phase Transition Materials for Power- & Area-efficient Sense Amplifier.*
- [2016] **SRC GRC (Global Research Collaboration) Annual Review**, West Lafayette, IN, USA.
Title: *Physics-Based Circuit-Compatible SPICE Model for Ferroelectric Transistors.*
- [2016] **SRC LEAST (Low Energy System Technology) Annual Review**, West Lafayette, IN, USA.
Title: *Phase Transition Material Based Selector Design for Cross-point memories.*
- [2015] **NSF IUCRC (Industry–University Cooperative Research Centers)**, University of Virginia, USA.
Title: *Correlated Material Enhanced Non-Volatile Memories.*

Invited Talks (Recent):

- **University of Tennessee - Haslam Scholars Program**, Knoxville, TN, USA. [February 2020]
- **Grameenphone**, Dhaka, Bangladesh. [December 2019]
- **Bangladesh University of Engineering & Technology**, Dhaka, Bangladesh. [December 2019]
- **University of Virginia**, Charlottesville, VA, USA. [September 2019]
- **Idaho State University**, Pocatello, ID, USA. [March 2019]
- **Intel**, Santa Clara, CA, USA. [February 2019]
- **Oklahoma State University**, Stillwater, OK, USA. [January 2019]
- **International Univ. of Business, Agriculture & Technology**, Dhaka, Bangladesh. [January 2018]

Teaching/Mentoring Experience

- **Primary Instructor**

[Spring 2020]	ECE 433	Intro to VLSI	University of Tennessee, Knoxville
[Spring 2020]	ECE 533	Advanced VLSI Design	University of Tennessee, Knoxville
[Fall 2019]	ECE 651	CAD of VLSI Systems	University of Tennessee, Knoxville
- **Guest Lectures**

[Fall 2018]	ECE 55900	MOS VLSI Design	Purdue University
[Fall 2019]	ECE 651	Digital Integrated Circuits	Pennsylvania State University

- **Supervision**

- Mohammad Adnan Jahangir [First year PhD student]
Graduate Research Assistant, Dept. of EECS, University of Tennessee, Knoxville
- Shamiul Alam [First year PhD student]
Graduate Research Assistant, Dept. of EECS, University of Tennessee, Knoxville

- **Research Mentorship**

Mentored a total of 6 graduate & 6 undergraduate students from Dept. of EE, Pennsylvania State University (PSU) and Dept. of ECE, Purdue University.

Graduate Students:

- Shreya Gupta (PSU, 01/2016 – 01/2017)
- Sarbashis Das (PSU, 09/2016 - 05/2017)
- Baihua Xie (PSU, 01/2017-05/2017)
- Anupriya Chakraborty (PSU, 09/2016 - 05/2017)
- Danni Wang (PSU, 05/2015 - 05/2016)
- Zhesheng Chen (Purdue, 08/2018 – 02/2019)

Undergraduate Students:

- Kyle Sibert (PSU, 01/2015 – 12/2015)
- Jacob Covey (PSU, 12/2016 - 12/2017)
- William Wissing (PSU, 08/2015-12/2015)
- Mark Steiner (PSU, 08/2015 - 05/2016)
- Jason Shen (PSU, 12/2016 - 12/2017)
- Nicholas Jao (PSU , 05/2015 – 05/2016)

Professional Activities, Leadership & Services

Reviewer

- IEEE Electron Device Letters (EDL)
- IEEE Transactions on Very Large Scale Integration Systems (TVLSI)
- IEEE Transactions on Circuits and Systems-I (TCAS-I)
- IEEE Transactions on Electron Devices (TED)
- IEEE Transactions on Nanotechnology (TNANO)
- IEEE Transactions on Computer-Aided Design of ICs & Systems (TCAD)
- Journal of the Electron Devices Society (JEDS)
- Elsevier: International Journal of Electronics & Communications
- MDPI: Technologies
- MDPI: Electronics

TPC Member

- International Conference on Neuromorphic Systems (ICONS), 2020
- IEEE TENSYP, 2020

Session Chair

- 21st International Symposium on Quality Electronic Design (ISQED)
- 14th Intl. Conference on Computer Modelling & Simulation (UKsim)

Member

- *Institute of Electrical and Electronics Engineers (IEEE)*
 - IEEE Electron Device Society (EDS)
 - IEEE Nanotechnology Council
 - IEEE Solid-State Circuits Society
 - IEEE Council on Electronic Design Automation
- *Semiconductor Research Corporation (SRC)*
- *American Association for the Advancement of Science (AAAS)*
- *American Society for Engineering Education (ASEE)*

Team Leader

- *Competitions*
 - International Robot's Got Talent (IRGT), Country Round, 2013
 - National Electronic Project Exhibition & Competition, Bangladesh, '13
 - EEE Project Show, BUET, Bangladesh '12
 - Inter University Tech Fiesta, Khulna, Bangladesh '12
- *Tech Exhibitions*
 - CNSER Project Exhibition '13
 - Digital World Exhibition '13

Professional Trainings

- [2018] **Preparing Future Faculty**, Purdue University
A semester long training arranged by *Purdue Graduate School* for prospective faculty candidates. Contents: grant writing, teaching philosophy, outreach, mentoring and group management.
- [2018] **Devices for Beyond Von Neumann Computing**, University of California, Santa Barbara
A short course offered during 76th Device Research Conference (DRC) focusing on neuromorphic and quantum computing.
- [2017] **Chips & How We Build Them**, GlobalFoundries, Fab 8
Month long internal technical training on cutting-edge fabrication/characterization processes.
- [2017] **Memory devices for Next 10 Years**, University of Notre Dame
A short course offered during 75th Device Research Conference (DRC) focusing on cutting-edge and emerging memory technologies.
- [2014] **Compact Modeling in Verilog A**, Purdue University
Special 2-day long training session organized by NEEDS (nanoHUB) on basics and best practices for compact modeling.
- [2013] **Technical Training on Programming**, Samsung R&D Institute
Official training on programming languages, Product Development Kit (PDK), Software Development Kit (SDK) and other relevant fundamentals.