Benjamin W. Walker

Richardson, TX 75080 · Ben.Walker2@utdallas.edu · (985) 264-1836 · linkedin.com/in/benjaminwwalker

Education

The University of Texas at Dallas May 2023
B.S. in Physics and B.S. Electrical Engineering, Minor in Nanotechnology *GPA: 3.92*

Northwestern State University May 2019
Associate's of General Studies *GPA: 3.85*

Louisiana School for Math, Science, and the Arts (LSMSA) May 2019
High School Diploma *GPA: 3.93*

Fellowships

Barry Goldwater Scholarship March 2022
- Most prestigious award for an undergraduate researcher from my work in skyrmion logic devices.

National Merit Scholarship March 2019
- Received full-ride scholarship at UT Dallas plus housing and $28,000 in stipends

Professional Experience

Undergraduate Research Assistant Oct 2019 – Present
University of Texas at Dallas *Richardson, TX*
- Harnessed the properties of magnetic materials to explore and implement beyond-CMOS technologies for Dr. Joseph Friedman's NeuroSpinCompute laboratory
- Designed micromagnetic skyrmion logic structures and performed Mumax3 simulations using voltage-controlled magnetic anisotropy (VCMA) for skyrmion synchronization and propagation, resulting in highly efficient and quick logic.

Hardware Engineering Intern May 2022 – July 2022
Microsoft *Raleigh, NC*
- Helped develop a custom floorplanning step by pre-placing standard cells and buffers and pre-routing trunks on high-speed critical buses to achieve flop to flop reach in several millimeters
- Created an interpreter between Innovus and Fusion Compiler (FC) for our TCL Physical Design scripts, aiding my team's translation effort
- Improved the efficiency of my translated floorplanning procedures for a SOC block by over 50%

Visiting Researcher Jan 2022 – April 2022
Universidad de Salamanca *Salamanca, Spain*
- Designed voltage-driven reversible skyrmion logic circuits to reduce energy consumption by over two orders of magnitude
- Used parametric modeling in COMSOL to increase electrical efficiency of my micromagnetic device by 70%

MRSEC Research Experience for Undergraduates May 2021 – Aug 2021
University of Texas at Austin *Austin, TX*
- Fabricated, and tested WSe2-based devices for Dr. Jean Anne Incorvia's Integrated Nano Computing lab
- Performed tape exfoliation, electron beam lithography (EBL), atomic force microscopy (AFM), and magneto-optic Kerr effect (MOKE) imaging to fabricate and validate device structure and operation
- Created field-effect transistors (FETs) with ambipolar behavior, demonstrating the valley-Hall effect

Electrical Engineering Intern Jan 2021 – Aug 2021
Texas Analog Center for Excellence *Richardson, TX*
- Helped design a spin transfer torque (STT) memristor-based neuromorphic chip, collaborating with graduate students
- Verified aspects of device's logical operation via Verilog to prepare tapeout for foundry

Journal Publications

1. **B. W. Walker**, F. Garcia-Sanchez, A. J. Edwards, X. Hu, M. P. Frank, F. Garcia-Sanchez, J. S. Friedman Near-Landauer Reversible Skyrmion Logic with Voltage-Based Propagation, *ArXiv Condensed Matter*, Jan 2023, *doi*: 10.48550/arXiv.2301.10700

2. X. Hu, **B. W. Walker**, F. Garcia-Sanchez, A. J. Edwards, P. Zhou, J. A. C. Incorvia, A. Paler, M. P. Frank, J. S. Friedman, Logical and Physical Reversibility of Conservative Skyrmion Logic, *IEEE Magnetics Letters*, May 2022, *doi*: 10.1109/LMAG.2022.3174514

3. **B. W. Walker**, C. Cui, F. Garcia-Sanchez, J. A. C. Incorvia, X. Hu, and J. S. Friedman, "Skyrmion Logic Clocked via Voltage- Controlled Magnetic Anisotropy" *Applied Physics Letters*, May 2021, *doi*: 10.1063/5.0049024

Conference Publications and Presentations

1. **B. W. Walker**, F. Garcia-Sanchez, A. J. Edwards, X. Hu, M. P. Frank, F. Garcia-Sanchez, J. S. Friedman Near-Landauer Reversible Skyrmion Logic with Voltage-Based Propagation, *Government Microcircuit Applications & Critical Technology Conference*, Mar. 2023.*

2. X. Hu, **B. W. Walker**, F. Garcia-Sanchez, P. Zhou, J. A. C. Incorvia, A. Paler, M. P. Frank, J. S. Friedman, Logical and Physical Reversibility of Conservative Skyrmion Logic, *Government Microcircuit Applications & Critical Technology Conference*, Mar. 2022.

3. **B. W. Walker**, B. W. Walker, C. Cui, F. Garcia-Sanchez, J. A. C. Incorvia, X. Hu, J. S. Friedman, Conservative Skyrmion Logic with Voltage-Controlled Magnetic Anisotropy Synchronization, *Joint IEEE International Magnetics Conference & Conference on Magnetism and Magnetic Materials*, Jan. 2022.*

4. **B. W. Walker**, C. Cui, F. Garcia-Sanchez, J. A. C. Incorvia, X. Hu, and J. S. Friedman, Skyrmion Logic with Voltage-Controlled Magnetic Anisotropy Clocking *Texas Analog Center for Excellence Symposium*, Oct. 2021*

5. X. Hu, M. Chauwin, F. Garcia-Sanchez, **B. W. Walker**, N. Betrabet, J. A. C. Incorvia, A. Paler, C. Moutafis, J. S. Friedman, Skyrmion Logic System for Large-Scale Reversible Computing, *IEEE International Conference on Nanotechnology*, Jul. 2021 (invited).

6. **B. W. Walker**, C. Cui, F. Garcia-Sanchez, J. A. C. Incorvia, X. Hu, and J. S. Friedman, "Voltage Controlled-Clocked Skyrmion Logic Synchronizers," *International Conference on Nanomagnetism and Spintronics (Solitons and Skyrmion Magnetism)*, Jun. 2021*

*Presented In-Person

Poster Presentations

1. **B. W. Walker**, A. J. Edwards, F. Garcia-Sanchez, M. P. Frank, and J. S. Friedman "Low-Dissipation Conservative Skyrmion Logic with Voltage-Based Propagation," *University of Texas at Dallas Undergraduate Research Scholar Awards*, Apr. 2022

2. **B. W. Walker**, X. Li, and J. A. C. Incorvia, "Fabrication and Analysis of WSe2-based Electronic Devices," *MRSEC REU Poster Presentation*, Jul. 2021

3. **B. W. Walker**, C. Cui, F. Garcia-Sanchez, J. A. C. Incorvia, X. Hu, and J. S. Friedman "Skyrmion Logic Clocked via Voltage-Controlled Magnetic Anisotropy," *University of Texas at Dallas Undergraduate Research Scholar Awards*, Apr. 2021

Awards

Undergraduate Research Scholar Award: Accepted for presentation at UT Dallas	April 2021/2022
TxACE Best Poster Award: Presented research and won against 30 graduate students	October 2021
Colorado Trail Thru-Hiker: Hiked 500 miles from Denver to Durango, Colorado	August 2021
First Place CometHack: Our thermostat project won first prize	April 2021
National Youth Science Foundation Delegate: Louisiana's State Representative	May 2019
Hall of Fame: Highest honor for my high school (analogous to valedictorian)	May 2019
Eagle Scout: Boy Scouts of America's highest honor	July 2016