

Benjamin W. Walker

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EDUCATION

The University of Texas at Dallas <i>Bachelor of Science in Physics and Electrical Engineering, Minor in Nanotechnology</i> <i>Full-Ride National Merit Scholarship, Collegium V Honors College</i>	May 2023 GPA: 3.94
Northwestern State University <i>Associate's of General Studies</i>	May 2019 GPA: 3.85
Louisiana School for Math, Science, and the Arts (LSMSA) <i>High School Diploma</i>	May 2019 GPA: 3.93

PROFESSIONAL EXPERIENCE

Undergraduate Research Assistant <i>University of Texas at Dallas</i> <ul style="list-style-type: none">Harnessed the properties of magnetic materials to explore and implement beyond-CMOS technologies for Dr. Joseph Friedman's NeuroSpinCompute laboratoryDesigned 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.	Oct 2019 – Present Richardson, TX
Hardware Engineering Intern <i>Microsoft</i> <ul style="list-style-type: none">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 millimetersCreated an interpreter between Innovus and Fusion Compiler (FC) for our TCL Physical Design scripts, aiding my team's translation effortImproved the efficiency of my translated floorplanning procedures for a SOC block by over fifty percent	May 2022 – July 2022 Raleigh, NC
Visiting Researcher <i>Universidad de Salamanca</i> <ul style="list-style-type: none">Designed ultra-low dissipation reversible skyrmion logic circuits to reduce energy consumption by over two orders of magnitudeDeveloping mathematical models to simulate complex micromagnetic devices more efficiently	Jan 2022 – April 2022 Salamanca, Spain
MRSEC Research Experience for Undergraduates <i>University of Texas at Austin</i> <ul style="list-style-type: none">Fabricated, and tested WSe₂-based devices for Dr. Jean Anne Incorvia's Integrated Nano Computing labPerformed tape exfoliation, electron beam lithography (EBL), atomic force microscopy (AFM), and magneto-optic Kerr effect (MOKE) imaging to fabricate and validate device structure and operationCreated field-effect transistors (FETs) with ambipolar behavior, demonstrating the valley-Hall effect	May 2021 – Aug 2021 Austin, TX
Electrical Engineering Intern <i>Texas Analog Center for Excellence</i> <ul style="list-style-type: none">Helped design a spin transfer torque (STT) memristor-based neuromorphic chip, collaborating with graduate studentsVerified aspects of device's logical operation via Verilog to prepare tapeout for foundry	Jan 2021 – Aug 2021 Richardson, TX

JOURNAL PUBLICATIONS

1. 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
2. **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. 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.
2. **B. W. Walker**, N. Betrabet, J. A. C. Incorvia, A. Paler, C. Moutafis, J. S. Friedman, Skyrmion Logic System for Large-Scale Reversible Computing, *Joint IEEE International Magnetics Conference & Conference on Magnetism and Magnetic Materials*, Jan. 2022.
3. **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
4. 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).
5. **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

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

Barry Goldwater Scholarship: Most prestigious scholarship for an undergraduate researcher	March 2022
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 an LSMSA graduate (analogous to valedictorian)	May 2019
National Merit Scholar: Winner of National Merit Scholarship Corporation's scholarship	March 2019
Eagle Scout: Boy Scouts of America's highest honor	July 2016

ACADEMIC PROJECTS

Music CheckIn: A Service for Monitoring Music Activity	June 2021
<ul style="list-style-type: none">• Developed a web service utilizing Amazon Web Services (AWS) to monitor users' Spotify activity and notify their friends about unhealthy listening behavior	
EcoStat: A Smarter and More Environmentally Friendly Thermostat	April 2021
<ul style="list-style-type: none">• Collaborated with team of three to develop smart thermostat using Raspberry Pi and Python that actively calculates the thermal resistance of its environment via simulation to conserve energy	

- Won first prize at CometHack 2021 and is the current thermostat for my apartment

Simulation of Cane Toads with Parallel Processing

March 2019

- Using MPI for Python, created an agent-based model to simulate the dietary habits of the invasive Cane Toad
- Identified the most efficient form of fencing to minimize ecological damage

Organic Synthesis of Paranitraniline Red

January 2019 - May 2019

- Collaborated with a team for a semester in an organic chemistry lab. Used theoretical knowledge of chemistry to pioneer an alternative approach to the standard synthesis pathway which improved yield.

TECHNICAL SKILLS

Languages: Python, C/C++, Bash, MATLAB, Verilog, JavaScript, LaTeX

Frameworks/OS/Applications: AWS, Unix/Linux, LabQuest, Mathematica, MS Office, Adobe Suite

EDA Tools: PSpice, Virtuoso, Fusion Compiler, Innovus

Instrumentation: AFM, EBL, MOKE-imaging, IR Spec., Physics/Engineering Laboratories, Organic Synthesis

COMMUNITY INVOLVEMENT

IEEE - Head Tutor for Digital Circuits

August 2020 – Present

University of Texas at Dallas

- Tutors students in a variety of electrical engineering courses for 4+ hours per week
- Collaborates with professors and hosts review sessions prior to each test

Society of Physics Students - Secretary

August 2020 – Present

University of Texas at Dallas

- Takes notes and helps run a variety of social and professional events for our SPS chapter

Outdoors Club - President

January 2018 - May 2019

LSMSA

- Founded and ran the Outdoors Club which organized bimonthly hiking and kayaking trips.

RELEVANT COURSEWORK

University of Texas at Dallas

Condensed Matter Physics (A+)	Analog / Integrated Circuits (IP)	Embedded Systems (IP)
Quantum Mechanics I/II (A-/A)	Electronic Circuits (A)	Quantum Computing (A)
Classical Mechanics (A+)	Electromagnetic Engineering (A+)	Modern Physics (A-)
Optics (B+)	Electronic Devices (A)	Systems and Controls (A)
Thermo / Statistical Mechanics (A)	Electrical Network Analysis (A+)	Differential Equations (A)
Numerical Methods (A+)	Signals and Systems (A+)	Theoretical Physics (A-)
Nanoscience I/II (A/A-)	Digital Circuits (A+)	Advanced Engineering Math (CR)
Contemporary Physics (A+)	Digital Systems (A+)	Linear Algebra (A)

Northwestern State University

Comparative Neurobiology (B)	Certified Ethical Hacking (A)	Multivariable Calculus (A)
Calculus of Complex Variables (A)	Network Design/Hardware (A)	Theory of Probability (A)

Louisiana School for Math, Science, and the Arts

Ind. Study Tensor Analysis (A)	Mathematical Physics (A)	Organic Chemistry I/II/Lab (A)
Electrodynamics (A)	Graph Theory (A)	Biochemistry (A)
Inorganic Chemistry I (A)	Chaos Theory (A)	Thermochemistry (A)
Quantum Mechanics I (A)	Differential Equations (A)	Intro Chemistry I/II/Lab (A)
Modern Physics/Lab (A)	Calculus I/II/III (A)	Mathematical Modeling (A)
Intro Physics I/II/Lab (A)	Computer Science I (A)	Data Analysis & Visualization (A)