

# JOSEPH V. D'AMICO IV

## Curriculum Vitae

January 2024

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## PERSONAL STATEMENT

My main professional goal is to put my background in electrical and computer engineering to good use in a fulfilling R&D career. As a quick learner with a solid understanding of programming and engineering fundamentals, I believe I am well-equipped to make meaningful contributions to almost any team effort by leveraging past experience and developing new skills as necessary. I have worked on projects ranging from low-level ASIC layouts to high-level machine-learning software, but my recent projects have focused on characterizing the effects of radiation on microelectronics. I am currently being evaluated for a DOE Q clearance, and references are available upon request.

## EDUCATION

### Ph.D. in Electrical Engineering

Vanderbilt University

📅 Expected May, 2024

📍 Nashville, TN

Dissertation Title: *Ultra-Low-Overhead Arbitrary-Waveform Generation as a Macro: Augmenting the Characterization of Radiation-Induced Transient Effects in Highly Scaled Integrated Circuits*

### M.S. in Electrical Engineering

Vanderbilt University

📅 May, 2021

📍 Nashville, TN

Computer Science Minor

### B.S. in Electrical Engineering

Rice University

📅 May, 2018

📍 Houston, TX

Business Minor

## RESEARCH EXPERIENCE

### Senior R&D S&E Electronics Engineer

Sandia National Laboratories

📅 January 2024 – Present

📍 Albuquerque, NM

- Member of the Advanced  $\mu$ Systems Rad Effects organization.
- Contributed to prompt-dose and total-ionizing-dose (TID) experiments.

Skills and Tools: C Python MATLAB Linux Altium

### Graduate Research Assistant

Vanderbilt University

📅 June 2019 – December 2023

📍 Nashville, TN

- Research assistant to Dr. Jeff Kauppila in the radiation effects and reliability group.
- Worked as part of a team that designed ASICs containing an on-chip method for measuring and characterizing low-amplitude photocurrents, fabricated in 22nm FD-SOI and 45nm PD-SOI technologies.
- Researched and developed an on-chip arbitrary-waveform generator (AWG) optimized for built-in self-test (BIST) and radiation-event emulation.
- Planned, prepared, and performed heavy-ion, prompt-dose, pulsed-laser, and total-ionizing-dose (TID) experiments.

Skills and Tools: Cadence Virtuoso KiCad C Python MATLAB Linux SKILL

### SEERI R&D Graduate Intern

Sandia National Laboratories

📅 May 2022 – August 2022

📍 Albuquerque, NM

- Went on trips to radiation-testing facilities and gained valuable experience with TID and low-dose-rate testing.
- Analyzed TID-induced threshold-voltage shifts in SiC power devices.

Skills and Tools: Radiation Effects and Testing Python

## A Digital Cure for Epilepsy 2018 <sup>🔗</sup>

Rice University and University of Texas Health Science Center

📅 March 2017 – May 2018

📍 Houston, TX

- Our senior design team researched and created machine-learning system capable of predicting and preventing seizures in patients who are unable to rely on traditional epilepsy treatment options.
- Decreased the bit length and number of DSP segments used by our algorithm's FPGA implementation so that it could fit on a system on module (SoM) and be more efficient.

Skills and Tools: C Python

## Undergraduate Research Assistant

Rice University

📅 November 2015 – May 2017

📍 Houston, TX

- Researched multiple-input and multiple-output (MIMO) systems under Dr. Joe Cavallaro as part of the Vertically Integrated Projects (VIP) program.
- Implemented a prototype precoding algorithm for a base station using fast basic linear algebra subprograms (BLAS) libraries and alternating direction method of multipliers (ADMM) optimization.
- Wrote parallel Cholesky decomposition programs in CUDA and MATLAB to be used in an ADMM implementation.

Skills and Tools: C CUDA MATLAB

# ADDITIONAL EXPERIENCE

## Graduate Teaching and Lab Assistant

Vanderbilt University

📅 August 2018 – May 2019

📍 Nashville, TN

- Assisted with the classes Introduction to Engineering and Digital Logic.
- Helped grade and conduct labs related to circuit basics.
- Helped students learn to solder and program state machines into field-programmable gate arrays (FPGAs).
- Taught the Digital Logic class when the professor was travelling.

Skills and Tools: C Verilog

## Products and Technology Intern

Baker Hughes Company

📅 May 2017 – August 2017

📍 Houston, TX

- Developed an excel add-in to identify missing fields from a project database, saving hours over manual searches.
- Used machine learning and regression analysis to search for factors affecting project profitability.

Skills and Tools: VBA Excel Python

## Undergraduate Teaching and Lab Assistant

Rice University

📅 January 2017 – May 2018

📍 Houston, TX

- Assisted with the classes Fundamentals of Computer Engineering and Implementation of Digital Systems.
- Assisted students in the class with their required labs, most of which relate to programming a microcontroller in C.
- Helped students learn to solder and design printed circuit boards.

Skills and Tools: C Eagle Verilog ARM Thumb Assembly

## Summer Shadowing

NASA Kennedy Space Center

📅 June 2015 – July 2015

📍 Merritt Island, FL

- Assisted and shadowed the principal investigator of the Robotics and Autonomous Systems group.
- Helped build a device to test the propulsion system for a probe that will be used to look for resources on asteroids and possibly Mars.

## HONORS AND ACCOMPLISHMENTS

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Russell G. Hamilton Scholar  
Vanderbilt University

📅 August 2018 – December 2023  
📍 Nashville, TN

NDIA Fellowship Award  
National Defense Industrial Association Tennessee Valley Chapter

📅 April 20 2022  
📍 Huntsville, AL

## PROFESSIONAL MEMBERSHIPS

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Institute of Electrical and Electronics Engineers (IEEE)

📅 January 2016 – Present

- Member, January 2016 – Present
- Nuclear and Plasma Sciences Society (NPSS) Member, January 2021 – Present
- Vanderbilt NPSS Student Chapter Vice Chair, April 2021 – April 2023

## PUBLICATIONS

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### 📄 Journal Articles

- **Joseph V. D'Amico IV**, S. T. Vibbert, A. C. Watkins, B. C. Fahrenkrug, T. D. Haeffner, D. R. Ball, A. L. Sternberg, M. L. Alles, J. S. Kauppila, and L. W. Massengill, "Analysis of single-event upsets and transients in 22nm fully depleted silicon-on-insulator logic," *IEEE Transactions on Nuclear Science*, vol. 70, no. 4, pp. 387–393, Apr. 2023, ISSN: 1558-1578. DOI: 10.1109/TNS.2023.3237178.
- S. T. Vibbert, A. C. Watkins, **Joseph V. D'Amico IV**, M. W. McKinney, D. S. Vibbert, E. X. Zhang, D. R. Ball, T. D. Haeffner, M. L. Alles, J. S. Kauppila, and L. W. Massengill, "In situ measurement of TID-induced leakage using on-chip frequency modulation," *IEEE Transactions on Nuclear Science*, vol. 69, no. 3, pp. 367–373, Mar. 2022, ISSN: 1558-1578. DOI: 10.1109/TNS.2021.3135415.
- A. C. Watkins, S. T. Vibbert, **Joseph V. D'Amico IV**, J. S. Kauppila, T. D. Haeffner, D. R. Ball, E. X. Zhang, K. M. Warren, M. L. Alles, and L. W. Massengill, "Mitigating total-ionizing-dose-induced threshold-voltage shifts using back-gate biasing in 22-nm FD-SOI transistors," *IEEE Transactions on Nuclear Science*, vol. 69, no. 3, pp. 374–380, Mar. 2022, ISSN: 1558-1578. DOI: 10.1109/TNS.2022.3146318.
- **Joseph V. D'Amico IV**, D. R. Ball, J. Cao, L. Xu, M. Rathore, S.-J. Wen, R. Fung, B. Narasimham, J. S. Kauppila, L. W. Massengill, and B. L. Bhuvu, "Single-event upsets in a 7-nm bulk FinFET technology with analysis of threshold voltage dependence," *IEEE Transactions on Nuclear Science*, vol. 68, no. 5, pp. 823–829, May 2021, ISSN: 1558-1578. DOI: 10.1109/TNS.2021.3050719.
- S. T. Vibbert, M. W. McKinney, **Joseph V. D'Amico IV**, E. W. Richards, H. J. Wilson, D. R. Ball, T. D. Haeffner, J. S. Kauppila, W. T. Holman, and L. W. Massengill, "A novel on-chip photocurrent measurement circuit for sub-50nm silicon-on-insulator technologies," *Journal of Radiation Effects Research and Engineering*, vol. 39, no. 1, pp. 336–344, Apr. 2021.

### 👥 Conference Proceedings

- M. D. Hu, A. J. Butterfield, E. X. Zhang, S. T. Vibbert, **Joseph V. D'Amico IV**, D. R. Ball, M. L. Alles, W. T. Holman, J. S. Kauppila, and L. W. Massengill, "Multi-Mrad TID response of 45nm RFSOI floating-body and body-contacted transistors," in *Proceedings of the Hardened Electronics and Radiation Technology Conference (HEART)*, Omaha, Nebraska, Apr. 2023.
- **Joseph V. D'Amico IV**, S. T. Vibbert, R. M. Cadena, M. L. Alles, D. R. Ball, A. L. Sternberg, E. X. Zhang, W. T. Holman, J. S. Kauppila, and L. W. Massengill, "On-chip measurement and simulation of transistor-level transient photocurrent in sub-50nm SOI technology," in *Proceedings of the IEEE Nuclear & Space Radiation Effects Conference (NSREC)*, Kansas City, Missouri, Jul. 2023.
- E. L. Rhoades, M. L. Breeding, **Joseph V. D'Amico IV**, J. M. Young, J. E. Manuel, and D. R. Hughart, "Radiation response of COTS silicon carbide power MOSFETs in pulsed ionizing radiation environments," in *Proceedings of the Hardened Electronics and Radiation Technology Conference (HEART)*, Omaha, Nebraska, Apr. 2023.

- S. T. Vibbert, **Joseph V. D'Amico IV**, R. M. Cadena, M. L. Alles, D. R. Ball, E. X. Zhang, W. T. Holman, J. S. Kauppila, L. W. Massengill, S. R. Flom, J. M. Hales, A. Ildefonso, and D. P. McMorrow, "Characterization of transistor-level prompt dose and pulsed-laser effects in 45nm PD-SOI using an on-chip photocurrent measurement circuit," in *Proceedings of the Hardened Electronics and Radiation Technology Conference (HEART)*, Omaha, Nebraska, Apr. 2023.
- A. J. Butterfield, M. D. Hu, A. C. Watkins, **Joseph V. D'Amico IV**, S. T. Vibbert, J. S. Kauppila, E. X. Zhang, D. R. Ball, T. D. Haeffner, and L. W. Massengill, "TID responses of floating body and body contacted 45nm PDSOI NMOS transistors," in *Proceedings of the IEEE Nuclear & Space Radiation Effects Conference (NSREC)*, Provo, Utah, Jul. 2022.
- **Joseph V. D'Amico IV**, S. T. Vibbert, A. C. Watkins, B. C. Fahrenkrug, T. D. Haeffner, A. L. Sternberg, K. M. Warren, E. X. Zhang, J. S. Kauppila, and L. W. Massengill, "Analysis of single-event upset response in 22-nm fully-depleted silicon-on-insulator flip-flops," in *Proceedings of the IEEE Nuclear & Space Radiation Effects Conference (NSREC)*, Provo, Utah, Jul. 2022.
- J. S. Kauppila, D. S. Vibbert, K. M. Warren, D. R. Ball, T. D. Haeffner, S. T. Vibbert, **Joseph V. D'Amico IV**, A. C. Watkins, E. X. Zhang, C. J. Moyers, A. L. Sternberg, and L. W. Massengill, "Vertical integration of physics-based radiation models in a hierarchical integrated circuit design flow," in *Proceedings of the IEEE Nuclear & Space Radiation Effects Conference (NSREC)*, Provo, Utah, Jul. 2022.
- M. W. McKinney, J. S. Kauppila, S. T. Vibbert, A. C. Watkins, **Joseph V. D'Amico IV**, E. W. Richards, D. R. Ball, T. D. Haeffner, and L. W. Massengill, "A RHBD high-sample-rate clocked comparator for SOI technologies," in *Proceedings of the Government Microcircuit Applications and Critical Technology Conference (GOMACTech) 2021*, Mar. 2021.
- **Joseph V. D'Amico IV**, J. Cao, L. Xu, M. Rathore, S.-J. Wen, R. Fung, B. Narasimham, J. S. Kauppila, L. W. Massengill, and B. L. Bhuvu, "Single-event upsets in a 7-nm bulk FinFET technology with analysis of threshold voltage and bias dependencies," in *Proceedings of the IEEE Nuclear & Space Radiation Effects Conference (NSREC)*, Online, Dec. 2020.
- S. T. Vibbert, M. W. McKinney, **Joseph V. D'Amico IV**, E. W. Richards, H. J. Wilson, A. C. Watkins, D. R. Ball, T. D. Haeffner, J. S. Kauppila, and L. W. Massengill, "An on-chip photocurrent measurement circuit using sequential switched capacitor integration," in *Proceedings of the Government Microcircuit Applications and Critical Technology Conference (GOMACTech) 2020*, Canceled, Mar. 2020.

## Works in Progress

- M. D. Hu, A. J. Butterfield, E. X. Zhang, S. T. Vibbert, **Joseph V. D'Amico IV**, D. R. Ball, M. L. Alles, W. T. Holman, J. S. Kauppila, and L. W. Massengill, "Multi-Mrad TID response of 45nm RFSOI floating-body and body-contacted transistors," (In Progress).
- **Joseph V. D'Amico IV**, S. T. Vibbert, R. M. Cadena, M. L. Alles, D. R. Ball, A. L. Sternberg, E. X. Zhang, W. Timothy Holman, J. S. Kauppila, and L. W. Massengill, "On-chip emulation and measurement of variable-length photocurrents in sub-50nm ICs," (Accepted). DOI: 10.1109/TNS.2023.3343289.
- **Joseph V. D'Amico IV**, S. T. Vibbert, J. S. Kauppila, and L. W. Massengill, "An ultra-low-overhead on-chip 5-bit arbitrary-waveform generator using a distributed-centroid layout," en, (In Progress).
- S. T. Vibbert, **Joseph V. D'Amico IV**, R. M. Cadena, M. L. Alles, D. R. Ball, E. X. Zhang, W. T. Holman, J. S. Kauppila, L. W. Massengill, S. R. Flom, J. M. Hales, A. Ildefonso, and D. P. McMorrow, "On-chip waveform capture of prompt dose- and pulsed-laser induced photocurrents," (Accepted).

## SKILLS

### Programming

C/C++ Python MATLAB + Simulink Verilog

### Software and Platforms

Cadence Virtuoso KiCad Linux Arduino

### Concepts

Radiation Effects Radiation Testing IC Design Embedded Systems Digital Design Parallel Programming  
PCB Design Data Interpretation