T. Daniel Loveless, Ph.D.

Director, IU Center for Reliable and Trusted Electronics (IU CREATE)
Associate Professor
Intelligent Systems Engineering Department
Luddy School of Informatics, Computing, and Engineering
Indiana University

I. Contact Information:

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Bloomington, Indiana 47401
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II. Education:

Ph.D., Electrical Engineering, Vanderbilt University, August 2009
GPA: 3.83/4.00, Major GPA: 3.90/4.00
M.S., Electrical Engineering, Vanderbilt University, May 2007
GPA: 3.79/4.00, Major GPA: 3.88/4.00
B. S., Electrical Engineering, Georgia Institute of Technology, July 2004
High Honors, GPA: 3.54/4.00, Major GPA: 3.73/4.00

Selected Skills:

- Subject matter expert in microelectronics radiation effects
- Embedded systems based on field-programmable gate arrays (FPGAs), microprocessors and microcontrollers, and systems-on-chip
- CubeSat design
- Digital, analog, and mixed-signal design
- RF communications theory and design
- Integrated circuit design & layout: Cadence Virtuoso, L-Edit
- Use of advanced computing clusters for parallel simulation of devices and circuits
- Printed circuit board design and RF design/testing
- Circuit CAD applications: Cadence, SPICE, Spectre, SpectreRF
- Programming: Matlab, Mathematica, Python, Bash, VHDL, Verilog, Assembly, and others
- Other: Proficient in UNIX, electronic circuit-analysis instrumentation, data collection and analysis/correlation, analog and digital circuit modeling and simulation, design documentation and technical writing

III. Academic Appointments

Associate Professor 8/23 – present
Intelligent Systems Engineering Department
Luddy School for Informatics, Computing, and Engineering
Indiana University
Supervisor: Prof. Beth Plale, Professor and Chair, ISE Department (plale@iu.edu)

Guerry and UC Foundation Associate Professor 8/19 – 7/23
Electrical Engineering Department
College of Engineering and Computer Science
University of Tennessee at Chattanooga
Supervisor: Prof. Abdelrahman Karrar, Associate Professor and Interim Chair, EE Department (abdelrahman-karrar@utc.edu)

UC Foundation Assistant Professor 8/14 – 7/19
Electrical Engineering Department

College of Engineering and Computer Science
University of Tennessee at Chattanooga
Supervisor: Prof. Ahmed Eltom, Professor and Chair, EE Department (Ahmed-Eltom@utc.edu)

Research Assistant Professor 10/13 – 7/14
Department of Electrical Engineering and Computer Science
Vanderbilt University
Supervisor: Prof. Dan Fleetwood, Professor and Chair, Department of EECS
(dan.fleetwood@vanderbilt.edu)

Adjunct Assistant Professor 01/11 – 10/13
Department of Electrical Engineering and Computer Science
Vanderbilt University
Supervisor: Prof. Dan Fleetwood, Professor and Chair, Department of EECS
(dan.fleetwood@vanderbilt.edu)

Instructor 06/09 – 07/10
Department of Electrical Engineering and Computer Science
Vanderbilt University
Supervisor: Prof. Dan Fleetwood, Professor and Chair, Department of EECS
(dan.fleetwood@vanderbilt.edu)

Invited Lecturer for: 01/06 – 7/23
ENEE 4900 (Fundamentals of Engineering and Professionalism), Instructors: Abdul Ofoli, Ahmed Eltom, Univ. of Tennessee at Chattanooga
ENEE 5000 (Graduate Seminar), Instructor: Ahmed Eltom, Univ. of Tennessee at Chattanooga
EECE 213 (Circuits II), Instructors: Robert A. Reed, Jeff Black, Vanderbilt University
EECE 285 (VLSI), Instructors: Bharat L. Bhuva, Art Witulski, Vanderbilt University
EECE 304 (Radiation Effects and Reliability), Instructor: Dan Fleetwood, Vanderbilt University
EECE 342 (Advanced Digital Electronics), Instructor: Lloyd Massengill, Vanderbilt University
EECE 341 (Advanced Analog Electronics), Instructor: Lloyd Massengill, Vanderbilt University

Graduate Teaching Assistant 08/05 – 12/05
Department of Electrical Engineering, Vanderbilt University (EECE 235, Electronics I)
Instructor: Prof. Weng Poo Kang, Professor, Department of EECS
(weng.p.kang@Vanderbilt.Edu)

IV. Work Experience:

Director 07/24 – present
Indiana University Center for Reliable and Trusted Electronics (IU CREATE)
Supervisor: Prof. Scott Michaels (michaels@indiana.edu), Assistant Vice President for Centers and Core Facilities, IU Research
- Founding director of IU CREATE
- Lead over $16M in microelectronics research and workforce development efforts

Staff Engineer II (Senior Research Engineer) 09/09 – 10/13
Institute for Space and Defense Electronics, Vanderbilt University
Supervisors: Prof. Lloyd Massengill (lloyd.massengill@vanderbilt.edu)
Prof. Ron Shrimpf (ron.schrimpf@vanderbilt.edu)
- Provide engineering support including the design, analysis, and test of state-of-the-art technologies for commercial, aerospace, and military customers. Customers include, but not limited to Cisco Systems, BAE Systems, Navy, and Air Force.
- Lead and assist in sponsored research activities, including grant applications. Primary financial support through DTRA and NASA EPSCoR.

- Involved in multi-project, multi-task programming and/or engineering in support of department's projects.
- PI, Co-PI, or Technical Lead on projects totaling over $4 million in funding.
- Increased ISDE's integrated circuit design and fabrication capability by approximately 400%. Near 100% first-pass success rate in design of sub-100nm CMOS technologies. Instrumental in the design of the Vanderbilt/ISDE test coupon, a standard approach for analysis of radiation effects in advanced CMOS technologies. Technologies include, but are not limited to:
  - TSMC 40 nm, 28 nm, and 20 nm Bulk CMOS
  - IBM 180 nm, 130 nm, 90 nm, and 65 nm Bulk CMOS
  - IBM 45 nm, 32 nm SOI CMOS
  - IBM 14 nm SOI FinFET

Graduate Research Assistant 01/06 – 08/09

Radiation Effects and Reliability Group
Department of Electrical Engineering and Computer Science
Vanderbilt University
Advisor: Prof. Lloyd Massengill (lloyd.massengill@vanderbilt.edu)

- Ph.D. Dissertation: "A Generalized Single-Event Analysis and Hardening Options for Mixed-Signal Phase-Locked Loop Circuits," Vanderbilt University, Aug. 2009
- M.S. Thesis: "A Single-Event-Hardened Charge Pump for Phase-Locked-Loop Circuits," Vanderbilt University, May 2007
- Investigation and characterization of single-event effects in phase-locked loop circuits (experimental and theoretical)
- Responsible for the development of:
  - Novel design parameters for single transient mitigation in phase-locked loops
  - Analytical models for error propagation and design of phase-locked loop circuits
  - Radiation-hardened-by-design solutions and guidelines for mixed-signal integrated circuits
- Chip tape-outs:
  - Radiation hardened-by-design 200 MHz charge pump PLLs, IBM 130 nm 8RF process through MOSIS (Dec. 2005)
  - Radiation hardened-by-design 400 MHz and 1.2 GHz charge pump PLLs, IBM 90 nm 9SF process through MOSIS (May 2006)
  - Cyclic redundancy checker, AMI 0.5 μm process through MOSIS (Dec. 07)
  - Integer-N frequency dividers using CMOS and current-mode logic, MIT-Lincoln Labs 150 nm 3-dimensional SOI (Nov. 2008)
  - Radiation-hardened-by-design programmable clock generator and IC driver circuit (max speed 6 GHz), TSMC 45 nm bulk CMOS (Oct. 2009)
- Radiation effects testing experience:
  - Naval Research Laboratory: Two-photon absorption laser absorption for single-event transient characterization and 2-dimensional single-event upset/transient mapping of 130 nm phase-locked loop and voltage-controlled oscillator circuits, Jan. 2007, May 2007, June 2008, April 2009
  - Naval Research Laboratory: Two-photon absorption laser absorption for hardware Trojan detection and substrate well mapping, April 2009.
  - Lawrence Berkeley National Laboratory: Heavy-Ion induced single-event upset characterization of phase-locked loop circuits, June 2008
- Research proposal accepted for the Semiconductor Research Corporation's (SRC) IC Design Competition, 2007 (Phase One/Two Participant): *A Soft Error Hardened Pipelined Analog-to-Digital Converter and Phase-Locked Loop*

Intern 2001 – 2003
Transmission Power Supply/Electric Systems Operations/Control Support Systems
Tennessee Valley Authority
Supervisor: **Russell Robertson**
- Developed various applications/programs in support of the electric transmission network model

V. Consulting

Nu-Trek, Inc. 2017-2024
Supervisor: **Miriam Rauch (miriam.rauch@nu-trek.com)**
- Radiation effects test and design consultant

HRL Laboratories, LLC 2021-2023
Supervisor: **Jonathan Roderick (jdroderick@hrl.com)**
- Radiation effects consultant

Reliable Microsystems 2016-2023
Supervisor: **Lloyd Massengill (lloyd.massengill@reliablemicrosystems.com)**
- RF and high-speed digital design consultant

Edwin Bohr, Electronics, Inc. 2017-2018
Supervisor: **Bryan Grillone (bgrillone@bohr.com)**
- Embedded systems design consultant

ParkParrot 2014
Supervisor: **Chandler Burke (wchandlerburke@gmail.com)**
- Led design and prototyping of wireless ultrasonic transceiver

Suntronics, Inc. 2011
Supervisor: **Sam Rainwater (SLH2OH2O@aol.com)**
- Provided engineering support on the radiation testing of PLL sub-circuits, and analysis of acquired data for the evaluation of use in a Satellite Communications System.
- Required travel to Mesa, AZ for business meetings and Texas A&M University for radiation testing

VI. Research Support/Grants

PI: $ 16,378,153
Co-PI: $ 3,285,922
Other: $ 10,563,822
Total: $ 30,227,897

(1) Sandia National Laboratory, (10/25-9/27)
Title: RIPLL LDRD
Budget: $363,000
Role: PI
Percent Responsibility: 5% CY
Engineers: 1
Graduate Students: 2

(2) NASA, SBIR Phase II Sub-contract to CFD Research Corporation (10/25-9/27)
Title: Radiation Hardened Power Efficient Artificial Intelligence
and Machine Learning (AIML) Processor
Budget: $255,000
Role: PI
Percent Responsibility: 5% CY
Engineers: 1
Graduate Students: 1

(3) Indiana Economic Development Corporation, Regional Opportunities Initiative READI 2.0 (5/25-4/28)
Title: IU Microelectronics Core Facility
Budget: $4,000,000
Role: PI
Percent Responsibility: 1% CY
Engineers: 2
Graduate Students: 1

(4) Missile Defense Agency (MDA), Sub-contract to Stonybrook University (2/25-2/27)
Title: Energy Efficient and Fault Tolerant Acceleration of Deep Neural Networks
Budget: $300,000
Role: PI
Percent Responsibility: 4% CY
Graduate Students: 2

(5) ME Commons, Applied Research Institute, (01/25-12/26)
Title: State-of-the-Art Lab-to-Fab Automatic Test Equipment (ATE)
Budget: $300,000
Role: PI
Percent Responsibility: 4% CY
Engineers: 1

(6) NASA, Sub-contract to Vanderbilt University (11/24-3/30)
Title: The Polarized Submillimeter Ice-Cloud Radiometer (POLSIR): Observing the diurnal cycle of ice clouds in the tropics and sub-tropics
Budget: $185k
Role: Principal Investigator
Percent Responsibility: <1% CY
Graduate Students: 1
Undergraduate Students: 0

(7) NASA, SBIR Phase II Sub-contract to CFD Research Corporation (03/25-03/26)
Title: Programmable Photonic Integrated Circuits (PICs) for Radio Frequency (RF) Applications
Budget: $85k
Role: Principal Investigator
Percent Responsibility: <1% CY
Graduate Students: 1
Undergraduate Students: 0

(8) Defense Threat Reduction Agency (DTRA), SBIR Phase II Sub-contract to Reliable Microsystems, LLC (05/24-10/25)
Title: Development of radiation-aware EDA models within a commercial microelectronics design ecosystem
Budget: $259k
Role: Principal Investigator
Percent Responsibility: 8% CY
Graduate Students: 1
Undergraduate Students: 0

(9) Department of Defense (DoD, US Army) Sub-contract to Purdue University (10/24-3/25)
Title: IU NanoCore Facility
Budget: $1.3M
Role: Co-Principal Investigator
Percent Responsibility: 1% CY

(10) Indiana Economic Development Corporation (9/23-9/26)
Title: Workforce Ecosystem for RH Design Supplement
Budget: $1M
Role: Principal Investigator
Percent Responsibility: 4% CY
Graduate Students: 0
Undergraduate Students: 0

(11) SBIR Phase II: Missile Defense Agency (MDA) Sub-contract to CFDRC, (9/23 – 9/25)
Title: Heterogeneous computing system with dynamic fault tolerance to radiation harden commercial microelectronics (Hetero-Hard)
Budget: $610,993
Role: Principal Investigator
Percent Responsibility: 5% CY
Graduate Students: 3
Undergraduate Students: 0

(12) Defense Threat Reduction Agency, Sub-contract to Penn State, (8/22-5/26)
Title: Interaction of Ionizing Radiation with Matter University Research Alliance (IIRM-URA)
Budget: $740,000
Role: Principal Investigator
Percent Responsibility: 4% CY
Graduate Students: 2
Undergraduate Students: 2

(13) Department of Defense (DoD, US Army) Sub-contract to Purdue University (8/23-3/26)
Title: Workforce Ecosystem for RH Design
Budget: $5M
Role: Principal Investigator
Percent Responsibility: 12% CY
Graduate Students: 5
Undergraduate Students: 8

(14) Department of Defense (DoD, US Army) Sub-contract to Purdue University (1/21-3/27)
Title: SCALE Microelectronics Consortium
Budget: $886,250
Role: Principal Investigator
Percent Responsibility: 5% CY
Graduate Students: 2
Undergraduate Students: 12

(15) Department of Defense (DoD) Sub-contract to SkyWater Technology, (9/21 – 7/25)
Title: 90nm SkyWater Foundry Node Radiation Characterization and Process Development Kit (PDK) Development Project for Read-Out Integrated Circuits (ROICs)
Budget: $635,247
Role: Principal Investigator
Percent Responsibility: 12.5% CY
Graduate Students: 2
Undergraduate Students: 0

(16) NASA SBIR Phase I: Sub-contract to CFDRC, (9/24-2/25)
Title: Radiation Hardened Power Efficient Artificial Intelligence and Machine Learning (AIML) Processor
Budget: $30,000
Role: Principal Investigator
Percent Responsibility: 1% CY
Graduate Students: 1
Undergraduate Students: 0

(17) DTRA SBIR Phase I: Sub-contract to CFDRC, (8/1/23-7/31/24)
Title: Radiation Effects in 3DHI
Budget: $85,000
Role: Principal Investigator
Percent Responsibility: 5% CY
Graduate Students: 1
Undergraduate Students: 0

(18) Missile Defense Agency, Sub-contract to Nimbis, (1/23-12/23)
Title: ISEEU Radiation Effects Scheduling Tool
Budget: $148,000
Role: Principal Investigator
Percent Responsibility: 2% CY
Graduate Students: 1
Undergraduate Students: 0

(19) SBIR Phase I: Missile Defense Agency (MDA) Sub-contract to CFDRC, (12/21 – 6/22)
Title: Heterogeneous computing system with dynamic fault tolerance to radiation harden commercial microelectronics (Hetero-Hard)
Budget: $45,000
Role: Principal Investigator
Percent Responsibility: 2% CY
Graduate Students: 1
Undergraduate Students: 0

(20) Center for Excellence in Applied Computational Science & Engineering (CEACSE), Tennessee Higher Education Commission (7/21 – 6/23)
Title: Anti-Tamper IC Forensics and RF-Level Discrimination for Improved Trust (INFORM)
Budget: $90,000
Role: Principal Investigator
Percent Responsibility: 12.5% CY
Graduate Students: 2
Undergraduate Students: 0

(21) Department of Defense (DoD) (6/21-3/22)
Title: Investigating Threats to SEI Based Intelligence-Gathering
Budget: $434,569
Role: Co-Principal Investigator
Percent Responsibility: 5% CY
Graduate Students: 2
Undergraduate Students: 0

(22) Oak Ridge National Laboratory (ORNL), (9/20-3/22)
Title: Safer Power Network
Budget: $100,000
Role: Co-Principal Investigator
Percent Responsibility: 2% CY
Graduate Students: 1
Undergraduate Students: 0

(23) Air Force Research Laboratory (AFRL RV/RD), Cooperative Agreement (11/19 – 10/21)
Title: Fundamental Research into Radiation Effects in Cryogenic Electronics Technologies
Budget: $202,958
Role: Principal Investigator
Percent Responsibility: 30% CY
Graduate Students: 1
Undergraduate Students: 0

(24) National Science Foundation (10/19 – 9/23)
Title: SPX: Collaborative Research: Intelligent Communication Fabrics to Facilitate Extreme Scale Computing
Budget: $482,097
Role: Co-Principal Investigator
Percent Responsibility: 2% CY
Graduate Students: 2
Undergraduate Students: 0

(25) Office of Naval Research (ONR-NSWC), (5/19 – 10/19)
Title: Radiation Hardening By Design Through Ionizing Radiation Effects Spectroscopy and Intelligent Control
Budget: $39,862
Role: Principal Investigator
Percent Responsibility: 8.3% CY
Graduate Students: 1
Undergraduate Students: 0

(26) Center for Excellence in Applied Computational Science & Engineering (CEACSE), Tennessee Higher Education Commission (8/18 – 7/19)
Title: Ionizing Radiation Effects Spectroscopy for Secure Space and Defense Communications
Budget: $99,848
Role: Principal Investigator
Percent Responsibility: 12.5% CY
Graduate Students: 1.5
Undergraduate Students: 0.5

(27) Research Experience for Undergraduates, National Science Foundation (NSF) (03/18 – 2/23)
Title: REU Site: An Interdisciplinary CubeSat Research and STEM Education Platform at the University of Tennessee at Chattanooga (UTChattSat)
Budget: $359,783
Role: Principal Investigator
Percent Responsibility: 4.2% CY
Undergraduate Students: 10
Graduate Students: 1

(28) Defense Threat Reduction Agency (DTRA)
Sub-contract to Vanderbilt University (10/16 – 9/22)
Title: Fundamental Research into Radiation Resiliency of Emerging Circuit Technologies Appropriate to the CWMD Mission
Budget: $369,236
Role: Principal Investigator
Percent Responsibility: 9.6% CY
Graduate Students: 2

(29) Nu-Trek, Inc. (8/17 – 11/18)
Title: Characterization of Radiation Effects in a 180 nm Low-Resistance Semiconductor Process at Cryogenic Temperatures
Budget: $55,000
Role: Principal Investigator
Percent Responsibility: 37.5% CY
Graduate Students: 1

(30) Center for Excellence in Applied Computational Science & Engineering (CEACSE), Tennessee Higher Education Commission (8/17 – 7/18)
Title: Supplemental Award: Stochastic Modeling of Charge Trapping and Emission in Emerging Semiconductor Technologies
Budget: $3,581
Role: Principal Investigator
Percent Responsibility: 0% CY
Graduate Students: 1

(31) Center for Excellence in Applied Computational Science & Engineering (CEACSE), Tennessee Higher Education Commission (8/17 – 7/18)
Title: Unlocking the Secrets of RF-DNA Fingerprinting
Budget: $92,062
Role: Co-Principal Investigator
Percent Responsibility: 12.5% CY
Graduate Students: 2

(32) Center for Excellence in Applied Computational Science & Engineering (CEACSE), Tennessee Higher Education Commission (8/16 – 7/17)
Title: Modeling Space and Defense Environmental Effects in Emerging Integrated Circuit Technologies
Budget: $25,000
Role: Principal Investigator
Percent Responsibility: 8.3% CY
Graduate Students: 1

(33) Center for Excellence in Applied Computational Science & Engineering (CEACSE), Tennessee Higher Education Commission (8/16 – 7/17)
Title: Smart Buildings through Smarter Models
Budget: $99,753
Role: Co-Principal Investigator
Percent Responsibility: 12.5% CY
Graduate Students: 2

(34) Provost Student Research Award, The University of Tennessee at Chattanooga (7/15 – 6/16)
Title: Radiation Hardening of Low-Voltage AMS Circuits in Sub-32 nm CMOS
Budget: $1,000
Role: Faculty Advisor
Percent Responsibility: 0% CY
Undergraduate Student: 1 (Mathew Joplin)

(35) Defense Threat Reduction Agency (DTRA), Sub-contract to Vanderbilt University (1/15 – 7/16)
Title: Radiation Hardening of Low-Voltage AMS Circuits in Sub-32 nm
Budget: $72,888
Role: Principal Investigator
Percent Responsibility: 27.25% CY
Graduate Students: 1

(36) Defense Threat Reduction Agency (DTRA) (08/13 – 7/16)
Title: Characterization and Mitigation of Nanoscale CMOS
Budget: $2,500,175
Role: Project Manager
Percent Responsibility: 21.75% CY
Graduate Students: 3

(37) BAE Systems (11/13-9/14)
Title: Testing and Analysis of a High Performance Quadrature Phase-Locked Loop
Budget: $354,266
Role: Principal Investigator
Percent Responsibility: 15% CY
Graduate Students: 0

(38) BAE Systems (8/11-3/13)
Title: Radiation Effects Simulation/Modeling for Ultra Deep Submicron Microelectronics
Budget: $440,261
Role: Technical Lead
Percent Responsibility: 15% CY
Note: Responsible for $196,267.00 five month contract extension
Graduate Students: 0

(39) Honeywell, Inc. (7/12-5/13)
Title: Radiation Effects Analysis of HX5000 Technology
Budget: $174,450
Role: Engineering Support
Percent Responsibility: 23% CY
Graduate Students: 0

(40) Aero Thermo / Navy (1/13-12/15)
Title: SSP D5LE Program Support
Budget: $2,248,245
Role: Engineering Support
Percent Responsibility: 5% CY
Graduate Students: 0.5

(41) National Aeronautics and Space Administration (NASA) (2011-2013)
Title: Experimental Program to Stimulate Competitive Research (EPSCoR): RadFxSat- A University Based Satellite Program to Study Radiation Effects on Advanced Nanoelectronics
Budget: $749,952.00
Role: Co-Investigator
Percent Responsibility: 5% CY
Graduate Students: 1
Undergraduate Students: 4

(42) Ridgetop Group, Inc., U.S. Air Force (2010)
Title: Test Structure Layout for IBM 45nm TAPO SOI IC Fabrication Run
Budget: $26,576, 10 months
Role: Principal Investigator
Percent Responsibility: 15% CY
Graduate Students: 0

(43) Boeing Aerospace, Inc. (8/12-12/13)
Title: Boeing/DTRA Rad Hard by Design (RHBD) Phase 3 Task: Single Event Simulations in 45 nm SOI CMOS Technology
Budget: $671,190
Role: Engineering Support
Percent Responsibility: 15.36% CY
Graduate Students: 4

(44) Cisco Systems, 10 Party Sponsorship (8/12-3/15)
Title: TSMC 20 nm Logic Test Chip Design and Test
Budget: $893,616
Role: Engineering Support
Percent Responsibility: 12.82% CY
Graduate Students: 4

(45) Robust Chip / DTRA (8/12-8/14)
Title: Solutions for Single-Event Error in Ultra Deep Submicron Semiconductor Technologies Using Simulation
Budget: $259,885
Role: Technical Lead
Percent Responsibility: 11.22% CY
Graduate Students: 4

(46) Defense Threat Reduction Agency (DTRA) (4/09-9/13)
Title: Characterization and Mitigation of Single Event Effects
Budget: $2,850,000
Role: Technical Lead
Percent Responsibility: 5% CY
Graduate Students: 4

(47) Cisco Systems, 6 Party Sponsorship (8/10-8/13)
Title: Soft Error Analysis of Designs at 28 nm Platform
Budget: $525,000
Role: Engineering Support
Percent Responsibility: 2% CY
Graduate Students: 3

VI. Pending Research Support/Grants

PI:	**$ 1,650,000**
Co-PI:	**$ 0**
Other:	**$ 0**
Total:	**$ 1,650,000**

(48) DTRA SBIR Phase II: Sub-contract to CFDRC, (7/1/24-6/30/26)
Title: Efficient Characterization and Analysis of Radiation Hardness in Systems-on-a-Chip (SoC) and 3D Integrated Circuits (3D IC) Using Spectroscopy and Machine Learning Phase II
Budget: $450,000
Role: Principal Investigator
Percent Responsibility: 4% CY
Graduate Students: 2
Undergraduate Students: 0

(49) Department of Defense (DoD, US Army) Sub-contract to Pelican Defense (1/26-12/27)
Title: Data Acquisition and Analytics System for Dose Rate Test Correlation
Budget: $1.2M
Role: Co-Principal Investigator
Percent Responsibility: 5% CY

VII. Publications:

Total number of publications: **128** (105 refereed articles/proceedings, 15 non-refereed proceedings, 2 theses, 4 book chapters, 2 short courses)

Google Scholar **h-index of 32**; **i10-index of 67**; ≥ 3407 total citations.

Citations per year:

Year	Number of Citations
2007	4
2008	4
2009	12
2010	43
2011	60
2012	73
2013	142
2014	192
2015	298
2016	304
2017	245
2018	300
2019	263
2020	216
2021	243
2022	250
2023	257
2024	241
2025	145 (as of 10/22/2025)

Key: **BOLD** indicates my name, Underline indicates student author

Refereed Journal Articles and Conference Proceedings (105)

(1) T. Peyton and **D. Loveless**, "Single Event Upset Effects on Deep Neural Networks: A Model and Dataset-Level Perspective," *2025 RADiation and its Effects on Components and Systems Conference (RADECS)*, PE-7L, Antwerp, Belgium, Oct. 2025.

(2) J. L. Carpenter, T. Peyton, J. M. Hales, A. Ildefonso, D. McMorrow, S. Westfall, J. Lazenby, and **T. D. Loveless**, "A Hierarchical Framework for Classifying Analog Single-Event Transients by Shape," *IEEE Trans. Nucl. Sci.*, Oct. 2025, doi: 10.1109/TNS.2025.3622955.

(3) R. Balltazar-Felipe, J. Ermi, H. Hunnicutt, J. Tyler, I. Hudson, B. Himebaugh, D. R. Reising, and **T. D. Loveless**, "Effects of Total Ionizing Dose on Specific Emitter Identification and Authentication of Software-Defined Radios," *accepted IEEE Trans. Nucl. Sci.*, Oct. 2025.

(4) I. Hudson, J. L. Carpenter, T. Peyton, J. Kim, J. Ermi, R. Baltazar-Felipe, and **T. D. Loveless**, "Total Ionizing Dose Effects on Clock Systems and Peripheral Modules of the MSP430FR6989," *2025 IEEE Radiation Effects Data Workshop (REDW) (in conjunction with 2025 NSREC)*, Nashville, TN, 2025.

(5) J. L. Carpenter, **T. D. Loveless**, J. Kim, J. Pew, R. Young, M. Nour, P. Manos, M. Chambers, H. J. Barnaby, and J. Neuendank, "A Radiation-Hardened-by-Design Wide-Band Operational Amplifier Fabricated in the SkyWater S90LN 90 nm Process," *submitted to the JRERE, May 2025.*

(6) S. Westfall, **T. D. Loveless**, J. L. Carpenter, T. Peyton, J. Kim, H. J. Barnaby, J. Neuendank, M. Nour, P. Manos, and M. Chambers, "Built-In Self-Test Measurement of Radiation Effects in the SkyWater S90LN 90 nm Process," *submitted to the JRERE, May 2025.*

(7) J. H. Tyler, M. K. M. Fadul, M. R. Hilling, D. R. R. Reising, and **T. D. Loveless**, "Assessing adversarial replay and deep learning-driven attacks on specific emitter identification-based security approaches," *Springer Nature, Discover Internet of Things*, vol. 4, no. 25, Nov. 2024, doi: 10.1007/s43926-024-00077-2

(8) D. R. Reising, J. H. . Tyler, M. K. M. Fadul, M. R. Hilling, and **T. D. Loveless**, "Improved RF Fingerprint-based Identity Verification in the Presence of an SEI Mimicking Adversary," *J. of Cyber Security and Mobility*, vol. 13, no. 05, pp. 887–916, Sep. 2024, doi: 10.13052/jcsm2245-1439.1354.

(9) M. A Taha, M. M. K., Fadul, J. H. Tyler, J.H., D. R. Reising, and **T. D. Loveless,** "Enhancing internet of things security using entropy-informed RF-DNA fingerprint learning from Gabor-based images," *EURASIP J. on Info. Security*, 27 (2024). doi:10.1186/s13635-024-00175-2.

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Thesis and Dissertation (2)

T. D. Loveless, "A Generalized Single-Event Analysis and Hardening Options for Mixed-Signal Phase-Locked Loop Circuits," *Ph.D. Dissertation*, Vanderbilt University, Aug. 2009.

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Book Chapters (4)

Fadul, M.K.M., Willis, J.T., Reising, D.R., **Loveless, T.D.** (2022). An Analysis of Process Parameters for the Optimization of Specific Emitter Identification Under Rayleigh Fading. In: González-Vidal, A., Mohamed Abdelgawad, A., Sabir, E., Ziegler, S., Ladid, L. (eds) Internet of Things. GIoTS 2022. Lecture Notes in Computer Science, vol 13533. Springer, Cham. https://doi.org/10.1007/978-3-031-20936-9_22

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Short Courses (2)

INVITED **T. D. Loveless**, "The Tools of Our Trade: From Space Environment to Systems and Validation -Modeling Transistor and Device Level Radiation Effects," *2025 RADiation and its Effects on Components and Systems Conference (RADECS) Short Course*, Antwerp, Belgium, Sept. 2025.

INVITED **T. D. Loveless**, "Hardening Techniques for Analog and Mixed-Signal Circuits," *IEEE Nuclear Space and Radiation Effects Short Course*, pp. II-1-II-95, July 2021.

VIII. Conference Presentations (*without proceeding or associated publication*):
Invited Talks/Lectures (29)

(I1) *INVITED* "Tutorial: FPGA SEE Test Beam Planning and Ensuring Test Validity," by **T. D. Loveless**, *2025 Single-Event Effects Symposium/Military & Aerospace Programmable Logic Devices (SEE/MAPLD) Combined Workshop*, La Jolla, CA, May 2025.

(I2) *INVITED* "REACH-A Private Sector Model for Trusted 1200 Microelectronic Workforce Development," by S. Weeden-Wright, M. A. Thompson, J. Kauppila, J. Buckley, L. Massengill, and **D. Loveless**, *2025 HEART*, Apr. 2025.

(I3) *INVITED* "SCALE Microelectronics Workforce Development Panel," *First Tuesday, Purdue @ Westgate,* Westgate, Crane, IN, Oct. 2024.

(I4) *INVITED "*Ground Testing of Electronics for SEE Part 1: General Principles," *Academy for Radiation Effects and Survivability (A4RES)*, Baltimore, MD, June 2024.

(I5) *INVITED "*Single Event Effects: Mechanisms and Test Structure Design," *IEEE VLSI Test Symposium*, SS-1, Tempe, AZ, Apr. 2024.

(I6) *INVITED "*Advancing Secure and Resilient Microelectronics: Indiana University's Strategic Investment in Radiation Effects Mitigation," *University of Notre Dame, Electrical Engineering Seminar*, Indiana, Jan. 2024.

(I7) *INVITED* "Strategic Investment for Innovation: IU's Contribution to Microelectronics," *First Tuesday, Purdue@WestGate Academy*, Westgate, IN, Dec. 2023.

(I8) *INVITED* "The IU Center for Reliable and Trusted Electronics (CREATE)," *IU/NSWC Crane Strategic Partnership, Captain Boonyobhas and President Whitten*, NSWC Crane, Sept. 7, 2023.

(I9) *INIVTED* "Radiation Hardening for Analog and Mixed Signal Circuits," *Putting the Rad in Radiation Effects, DARPA ERI 2.0 Summit*, Seattle, WA, Aug. 2023.

(I10) *INIVTED* "Panel: Challenges for Radiation Effects Modeling in 3DHI," *panelist at the Putting the Rad in Radiation Effects, DARPA ERI 2.0 Summit*, Seattle, WA, Aug. 2023.

(I11) *INIVTED* "Panel: Modeling and Simulation-based Approaches to Radiation-Hardened Electronics Qualification" *panelist at the 2023 Government Microcircuits and Critical Applications Conference (GOMACTech)*, San Diego, CA, Mar. 2023.

(I12) *INVITED* "Hardening-By-Design Techniques for Analog and Mixed-Signal ASICs," by **T. D. Loveless**, presented at the 18th International School on the Effects of Radiation on Embedded Systems for Space Applications (SERESSA), CERN, Geneva, Switzerland, Dec. 2022.

(I13) *INVITED* "Basic SEE & Test Execution Definitions: Radiation in Materials and Active Devices," by **T. D. Loveless,** presented at the Single-Event Effects (SEE) Testing Bootcamp at the NASA Space Radiation Laboratory (NSRL), Sept. 2021.

(I14) *INVITED* "Space Radiation Effects in Microelectronic Systems," by **T. D. Loveless**, presented at the Tennessee Technological University, Cookeville, TN, Sept. 2021.

(I15) *INVITED* "Hardening Techniques for Analog and Mixed-Signal Circuits," by **T. D. Loveless**, presented at the 2021 IEEE Nuclear Space and Radiation Effects Short Course, Virtual, July 2021.

(I16) *INVITED* "Space Radiation and Its Effects on Microelectronic Systems," by **T. D. Loveless**, presented at the Macalester College, St. Paul, MN, Sept. 2019.

(I17) *INVITED* "Hardening-By-Design Techniques for Analog and Mixed-Signal ASICs," by **T. D. Loveless**, presented at the 12th International School on the Effects of Radiation on Embedded Systems for Space Applications (SERESSA), Munich, Germany, Oct. 2017.

(I18) *INVITED* "Hardening-By-Design Techniques for Analog and Mixed-Signal ASICs," by **T. D. Loveless**, presented at the 12th International School on the Effects of Radiation on Embedded Systems for Space Applications (SERESSA), Montreal, Quebec, Canada, Nov. 2016.

(I19) *INVITED* "Radiation Effects and Basic Mitigation Techniques for Mixed-Signal Electronics," by **T. D. Loveless**, presented at the 2016 Hardened Electronics and Radiation Technology (HEART) Conference, Monterey, CA, Apr. 2016.

(I20) *INVITED* "Embedded Systems and Small Satellites for Smart Cities," by **T. D. Loveless**, presented at the US Ignite Technical Interchange, UTC, Chattanooga, TN, Mar. 2016.

(I21) *INVITED* "Hardening-By-Design Techniques for Analog and Mixed-Signal ASICs," by **T. D. Loveless**, presented at the 11th International School on the Effects of Radiation on Embedded Systems for Space Applications (SERESSA), Puebla, Mexico, Dec. 2015.

(I22) *INVITED*, "RHBD Body-Driven Circuits for Low-Voltage AMS Systems", by **T. D. Loveless**, presented at the DTRA Radiation Effects Review, NRO Nanoscale Rad-Hard Review, General RHBD Technical Interchange Meeting Vanderbilt University, Nashville, TN, May 12-13, 2015.

(I23) *INVITED*, "Single-Event Mitigation Techniques for Analog and Mixed-Signal ASICs," by **Daniel Loveless**, presented at the 7th International School on the Effects of Radiation on Embedded Systems for Space Applications (SERESSA), Toulouse, France, Dec. 2011.

(I24) *INVITED* "Neutron-Induced Soft-Error Rate Measurements in 40 nm Bulk CMOS," by Daniel Loveless, presented at JEDEC G12 RHA Users Subcommittee Meeting, Tempe, AZ, Feb. 2011.

(I25) *INVITED*, "Single-Event Mitigation Techniques for Analog and Mixed-Signal ASICs," by **Daniel Loveless**, presented at the 6th International School on the Effects of Radiation on Embedded Systems for Space Applications (SERESSA), São José Dos Campos, Brazil, Dec. 2010.

(I26) *INVITED*, "Basic Radiation Effects Analysis, Modeling, and Hardening-by-Design," by **Daniel Loveless**, presented at the 6th International School on the Effects of Radiation on Embedded Systems for Space Applications (SERESSA), São José Dos Campos, Brazil, Dec. 2010.

(I27) *INVITED* "Mitigation Techniques for Analog and Mixed-Signal ASICs," by Daniel Loveless, presented at the Workshop on Mitigation Techniques Against Radiation on Integrated Circuits, the Space Research and Technology Centre of the European Space Agency (ESA/ESTEC), Noordwijk, The Netherlands, Sept. 2010.

(I28) *INVITED* "Basics Part II: An Overview of Radiation Effects Analysis," by **T. D. Loveless** and S. E. Armstrong, presented at the 5th International School on the Effects of Radiation on Embedded Systems for Space Applications (SERESSA), Takasaki, Japan, Dec. 2009.

(I29) *INVITED* "Basics Part I: Devices and Circuits for Radiation Environments," by S. E. Armstrong and **T. D. Loveless**, presented at the 5th International School on the Effects of Radiation on Embedded Systems for Space Applications (SERESSA), Takasaki, Japan, Dec. 2009.

Other (92):

(P1) "Dynamic Time Warping for ASET Cluster Analysis," by J. L. Carpenter, T. Peyton, J. M. Hales, A. Ildefonso, D. McMorrow, S. Westfall, J. Lazenby, and **T. D. Loveless**, *2025 Single-Event Effects Symposium/Military & Aerospace Programmable Logic Devices (SEE/MAPLD) Combined Workshop*, La Jolla, CA, May 2025.

(P2) "Impact of Single-Event Upsets on Deep Neural Networks," by T. Peyton A. Hubbard, J. L. Carpenter, A. Ildefonso, and **T. D. Loveless**, *2025 Single-Event Effects Symposium/Military & Aerospace Programmable Logic Devices (SEE/MAPLD) Combined Workshop*, La Jolla, CA, May 2025.

(P3) "A Radiation-Hardened-by-Design Wide-Band Operational Amplifier Fabricated in the SkyWater S90LN 90 nm Process," by J. L. Carpenter, **T. D. Loveless**, J. Kim, J. Pew, R. Young, M. Nour, P. Manos, M. Chambers, H. J. Barnaby, and J. Neuendank, *2025 HEART,* Monterey, CA, Apr. 2025.

(P4) "Built-In Self-Test Measurement of Radiation Effects in the SkyWater S90LN 90 nm Process," by S. Westfall, **T. D. Loveless**, J. L. Carpenter, T. Peyton, J. Kim, H. J. Barnaby, J. Neuendank, M. Nour, P. Manos, and M. Chambers, *2025 HEART*, Monterey, CA, Apr. 2025.

(P5) "Artificial Intelligence & Machine Learning (AI/ML) for Radiation Hardened Electronics," by Karthikeyan Lingasubramanian, *2024 Radiation Hardened Electronic Technologies Conference (RHET),* Huntsville, AL, Nov. 2024.

(P6) "Academy for Radiation Effects and Survivability," by Michael McKenna, *2024 Radiation Hardened Electronic Technologies Conference (RHET),* Huntsville, AL, Nov. 2024.

(P7) "SCMC Technical Projects and Infrastructure Investments of Interest to RHET Community," by Brett Hamilton, *2024 Radiation Hardened Electronic Technologies Conference (RHET),* Huntsville, AL, Nov. 2024.

(P8) "Heavy-Ion SET Response of a Wide-Band Operational Amplifier Fabricated in the SkyWater S90LN 90 nm Process," by J. Carpenter, **T. D. Loveless**, J. Kim, J. Pew, R. Young, M. Nour, P. Manos, M. Chambers, H. J. Barnaby, and J. Neuendank, *2024 Single Event Effects Symposium*. La Jolla, CA, May 2024.

(P9) "Built-in Self-Test Architecture for Characterization of Single Event Effects in Commercially Available Bulk 90nm Technology," by S. Westfall, **T. D. Loveless**, J. L. Carpenter, T. Peyton, J. Kim, J. Pew, R. Young, M. Nour, P. Manos, M. Chambers, H. J. Barnaby, and J. Neuendank, *2024 Single Event Effects Symposium,* La Jolla, CA, May 2024.

(P10) "Harnessing Machine Learning: Parallel Testing and Real-Time Analysis for Accelerated Radiation Effects Dataset Generation," T. Peyton and **T. D. Loveless**, *2024 Single Event Effects Symposium*. La Jolla, CA, May 2024.

(P11) "Comparison of Analytical and Machine-Learning Techniques for Radiation Effects Analysis," by T. Peyton, J. Carpenter, and **T. D. Loveless**, *2023 Single Event Effects Symposium*, La Jolla, CA, May 2023.

(P12) "FSEE at Year 1: Correlative Results and Initial User Experiences," by J. Likar, S. Lidia, **T. D. Loveless**, J. Carpenter, J. Osheroff, M. Casey, J. Oarethu, and S. Katz, *2023 Single Event Effects Symposium*, La Jolla, CA, May 2023.

(P13) "Detection of Single Event Transients in Arbitrary Waveforms using Statistical Window Analysis," by J. L. Carpenter, B. Dean, S. P. Lawrence, R. D. Young, D. R. Reising, and **T. D. Loveless**, *IEEE Nuclear and Space Radiation Effects Conference (NSREC)*, Provo, Utah, July, 2022.

(P14) "RADFX Scheduling Tool," by J. Meyers, Emily Turner, and **T. D. Loveless** (2022). NASA Electronic Partßs and Packaging (NEPP) Program 2022 Electronics Technology Workshop (ETW). Greenbelt, MD, June 2022.

(P15) "The SCALE Radiation Effects Workforce Development Program," by **T. D. Loveless** (2022). 2022 Single Event Effects Symposium. La Jolla, CA, May 2022.

(P16) "Supervised Learning and Classification of Single-Event Transient Anomalies," by T. Peyton, B. Dean, J. L. Carpenter, M. Fadul, D. R. Reising, and **T. D. Loveless** (2022). 2022 Single Event Effects Symposium. La Jolla, CA, May 2022.

(P17) "Functional Redundancy for Mitigation of SEE in Heterogeneous Computing Systems," by S. Camp, J. Carpenter, T. Skjellum, D. Reising, and **T. D. Loveless** (2022). 2022 Single Event Effects Symposium. La Jolla, CA, May 2022.

(P18) "Detection of Single Event Transients in Arbitrary Waveforms Using Statistical Window Analysis," by J. L. Carpenter and **T. D. Loveless** (2022). 2022 Single Event Effects Symposium. La Jolla, CA, May 2022.

(P19) "Training the Next-Generation Radiation Effects Test Engineer," by **T. D. Loveless** (2021). 2021 Single Event Effects Symposium. La Jolla, CA (Virtual).

(P20) "Towards AI-Based Mitigation of SEE," by **T. D. Loveless**, J. Carpenter, B. Dean, S. Lawrence, R. Young, and D. Reising (2021). 2021 Single Event Effects Symposium. La Jolla, CA (Virtual).

(P21) "Electrical Measurement of Cell-to-Cell Variation of Critical Charge in SRAM and Sensitivity to Single-EventUpsets by Low-Energy Protons," by J. Cannon, R. Estrada, R. Boggs, B. Patel, G. Santos, **T. D. Loveless**, M. W. McCurdy, A. L. Sternberg, and T. Finzell (2020). 2020 Single Event Effects Symposium. La Jolla, CA (Virtual).

(P22) "Electrical Measurement of Cell-to-Cell Variation of Critical Charge in SRAM and Sensitivity to Single-EventUpsets by Low-Energy Protons," by J. Cannon, R. Estrada, R. Boggs, B. Patel, G. Santos, **T. D. Loveless**, M. W. McCurdy, A. L. Sternberg, and T. Finzell (2020). 2020 Single Event Effects Symposium. La Jolla, CA (Virtual).

(P23) "A CubeSat Reaction Wheel-Based Attitude Control System," by B. Dean, D. Amaro, M. Bushra, M. E. Loveless, L. Elliott, and **T. D. Loveless**, presented at the 2020 Posters at the Capital, Nashville, TN, Feb. 2020.

(P24) "Electrical-Based Screening of Radiation Failure Modes in Transistor-Based Memory for Space Application," by J. Cannon, R. Estrada, R. Boggs, D. R. Reising, and **T. D. Loveless**, presented at the 2019 CUR REU Symposium, Alexandria, VA, Oct. 2019.

(P25) "Ionizing Radiation Effects Spectroscopy (IRES) for Analysis of Total Ionizing Dose Degradation in Voltage-Controlled Oscillators," by B. P. Patel, M. Joplin, R. Boggs, D. Reising, M. W. McCurdy, L. W. Massengill, and **T. D. Loveless**, presented at the IEEE Nuclear and Space Radiation Effects Conference (NSREC), Kona, HI, PA-3, July 2018.

(P26) "TID-Induced Leakage and Drive Characteristics of Planar 22-nm Partially-Depleted Silicon-on-Insulator and 14-nm Bulk and Quasi-Silicon-on-Insulator FinFET Devices," by M. P. King, M. P. King, J. G. Massey, A. Silva, E. H. Cannon, M. R. Shaneyfelt, **T. D. Loveless**, J. Ballast, M. Cabanas-Holmen, S. DiGregorio, W. C. Rice, B. L. Draper, P. Oldgies, and K. Rodbell, presented at the IEEE Nuclear and Space Radiation Effects Conference (NSREC), A-1, Kona, HI, July 2018.

(P27) *BEST STUDENT POSTER AWARD (2nd Place)* "The Response of Fuzzy Electronics to Ionizing Radiation," by S. Singh and **T. D. Loveless**, presented at the ASEE Southeastern Section Annual Conference, Daytona Beach, FL, Mar. 2018.

(P28) *BEST STUDENT POSTER AWARD (2nd Place)* "Efficacy of Fuzzy Electronics in Space," by S. Singh and **T. D. Loveless**, presented at the 52nd Annual Conference of the National Collegiate Honors Council (NCHC), Atlanta, GA, Nov. 2017.

(P29) "Undergraduate Research Experience in the Space Sciences," by **T. D. Loveless**, presented at the WCTL Instructional Excellence Conference, Chattanooga, TN, May 2017.

(P30) "UTChattSat: Space Science and Engineering in the Classroom," by **T. D. Loveless** and A. M. Patel, presented at the StartupCHA Week/Co.Lab Demo Night, Chattanooga, TN, Oct. 2016.

(P31) "UTChattSat," by **T. D. Loveless**, M. B. Joplin, A. M. Patel, and D. Johnson, presented at the GIGTank365 boutique accelerator pitch night, Chattanooga, TN, July 2016.

(P32) "A Single-Event Transient Measurement Payload for a 1U CubeSat," by M. B. Joplin, **T. D. Loveless**, J. S. Kauppila, and L. W. Massengill, presented at the 2016 Single-Event Effects Symposium, La Jolla, CA, May 2016.

(P33) "Radiation and Reliability Resiliency of Advanced and Emerging Integrated Circuit Technologies," by **T. D. Loveless**, M. B. Joplin, and A. M. Patel, presented at the 2016 University of Tennessee at Chattanooga Research Dialogues, Apr. 2016.

(P34) "Rocket Scientist, Engineer, and Educator," by **T. D. Loveless**, presented at the 2016 University of Tennessee at Chattanooga Research Dialogues Faculty Elevator Speech Competition, Apr. 2016.

(P35) "Frequency Trends Observed in 32 nm SOI Flip-Flops and Combinational Logic," by R. C. Quinn, J. S. Kauppila, **T. D. Loveless**, J. A. Maharrey, J. D. Rowe, M. W. McCurdy, M. L. Alles, B. L. Bhuva, R. A. Reed, K. Lilja, and L. W. Massengill, presented at the 2015 Nuclear Space and Radiation Effects Conference (NSREC), Boston, MA, July 2015.

(P36) "Layout based RHBD for Sequential and Combinatorial Logic," by K. Lilja, M. Bounasser, R.C. Quinn, J. S. Kauppila, **T. D. Loveless**, J.A. Maharrey, J.D. Rowe, M.W. McCurdy, M.L. Alles, B.L. Bhuva, R.A. Reed, and L. W. Massengill, presented at the 2015 Single-Event Effects Symposium, La Jolla, CA, May 2015.

(P37) "Power-Aware Mitigation of Combinational Logic Soft Errors," by N. N. Mahatme, N. J. Gaspard, T. Assis, **T. D. Loveless**, B.L. Bhuva, W. H. Robinson, L. W. Massengill, S.-J. Wen, R. Wong, presented at the 2014 Nuclear Space and Radiation Effects Conference (NSREC), Paris, FR, July 2014.

(P38) "Identification of a Pulse-Width Window of Vulnerability for Single-Event-Transient-Induced Harmonic Errors in Ring Oscillators," by Y. P. Chen, **T. D. Loveless**, P. Maillard, N. J. Gaspard, S. Jagannathan, A. F. Witulski, B. L. Bhuva, W. T. Holman, L. W. Massengill, presented at the 23rd Annual Single Event Effects (SEE) Symposium, La Jolla, CA, May 2014.

(P39) "Use of Alpha Particle and Ion Accelerators for Characterization of Soft-Error Reliability in Advanced ICs," by R. C. Quinn, **T. D. Loveless**, J. S. Kauppila, J. A. Maharrey, S. Jagannathan, E. X. Zhang, M. L. Alles, M. W. McCurdy, R. A. Reed, L. W. Massengill, presented at the 23rd International Conference on the Application of Accelerators in Research and Industry (CAARI), San Antonio, TX, May 2014.

(P40) "Single-Event Transient (SET) Analysis of 40 nm Digital-Controlled Oscillator (DCO) Topologies," by Y. Chen, **T. D. Loveless**, P. Maillard, S. Jagannathan, N. Gaspard, N. M. Atkinson, and L. W. Massengill, presented at the 22nd Annual Single Event Effects (SEE) Symposium, La Jolla, CA, April 2013.

(P41) "Single Event Investigations of a 40 nm Low Noise Amplifier," by K. Freeman, S. Jagannathan, **T. D. Loveless**, N. J. Gaspard, N. M. Atkinson, P. Maillard, J. S. Kauppila, and L. W. Massengill, presented at the 22nd Annual Single Event Effects (SEE) Symposium, La Jolla, CA, April 2013.

(P42) "A New Error Correction Circuit for Delay Locked Loops," by P. Maillard, W. T. Holman, **T. D. Loveless**, and L. W. Massengill, presented at the 22nd Annual Single Event Effects (SEE) Symposium, La Jolla, CA, April 2013.

(P43) "SET Pulse Width Trends in Highly Scaled SOI," by R. C. Quinn, J. A. Maharrey, **T. D. Loveless**, J. S. Kauppila, S. Jagannathan, N. M. Atkinson, N. J. Gaspard, E. Zhang, W. T. Holman, B. L. Bhuva, and L. W. Massengill, presented at the 22nd Annual Single Event Effects (SEE) Symposium, La Jolla, CA, April 2013.

(P44) "Effect of Negative Bias Temperature Instability on the Single Event Upset Response of 40 nm Flip-Flops," by A. V. Kauppila, B. L. Bhuva, **T. D. Loveless**, S. Jagannathan, N. J. Gaspard, J. S. Kauppila, L. W. Massengill, S-J. Wen, R. Wong, G. L. Vaughn, and W. T. Holman, presented at the 2012 Nuclear and Space Radiation Effects Conference (NSREC), Miami, FL, July 2012.

(P45) "On-Chip Measurement of Single-Event Transients in a 45 nm Silicon-on-Insulator Technology," by **T. D. Loveless**, J. S. Kauppila, S. Jagannathan, D. R. Ball, J. D. Rowe, N. J. Gaspard, N. M. Atkinson, R. W. Blaine, T. R. Reece, J. R. Ahlbin, T. D. Haeffner, M. L. Alles, W. T. Holman, B. L. Bhuva, L. W. Massengill, presented at the 2012 Nuclear and Space Radiation Effects Conference (NSREC), Miami, FL, July 2012.

(P46) "Frequency Dependence of Alpha-Particle Induced Soft Error Rates of Flip-Flops in 40-nm CMOS Technology," by S. Jagannathan, **T. D. Loveless**, B. L. Bhuva, N. J. Gaspard, N. Mahatme, T. Assis, S-J. Wen, R. Wong, and L. W. Massengill, presented at the 2012 Nuclear and Space Radiation Effects Conference (NSREC), Miami, FL, July 2012.

(P47) "Differential Charge Cancellation (DCC) Layout as an RHBD Technique for Bulk CMOS Differential Circuit Design," by R. W. Blaine, N. M. Atkinson, J. S. Kauppila, S. E. Armstrong, N. C. Hooten, **T. D. Loveless**, J. H. Warner, W. T. Holman, L. W. Massengill, presented at the 2012 Nuclear and Space Radiation Effects Conference (NSREC), Miami, FL, July 2012.

(P48) "Evaluation of Built-In-Self-Test Circuitry for Single-Event Transient Measurements in 45 nm SOI," by **T. D. Loveless**, J. S. Kauppila, D. R. Ball, S. Jagannathan, T. D. Haeffner, N. J. Gaspard, N. M. Atkinson, R. W. Blaine, T. R. Reece, M. L. Alles, W. T. Holman, B. L. Bhuva, and L. W. Massengill, presented at the 21st Annual Single Event Effects (SEE) Symposium, La Jolla, CA, April 2012.

(P49) "The Quad-Path Hardening Technique for Switched-Capacitor Circuits," by N. M. Atkinson, W. T. Holman, J. S. Kauppila, R. W. Blaine, **T. D. Loveless**, and L. W. Massengill, presented at the 21st Annual Single Event Effects (SEE) Symposium, La Jolla, CA, April 2012.

(P50) "RHBD Techniques for CMOS Operational Amplifier Design," by R. W. Blaine, N. M. Atkinson, J. S. Kauppila, **T. D. Loveless**, S. E. Armstrong, W. T. Holman, and L. W. Massengill, presented at the 21st Annual Single Event Effects (SEE) Symposium, La Jolla, CA, April 2012.

(P51) "Frequency Dependence of Alpha-Particle Induced Soft Error Rates of Flip-Flops in 40 nm CMOS Technology," by S. Jagannathan, **T. D. Loveless**, N. J. Gaspard, B. L. Bhuva, T. Assis, Z. J. Diggins, S-J. Wen, R. Wong, and L. W. Massengill, presented at the 21st Annual Single Event Effects (SEE) Symposium, La Jolla, CA, April 2012.

(P52) "SET Characterization of Two 90 nm Voltage Controlled Delay Line (VCDL) Topologies," by P. Maillard, L. W. Massengill, W. T. Holman, **T. D. Loveless**, Y. Chen, N. Roche, J. Warner, S. Buchner, and D. McMorrow, presented at the 21st Annual Single Event Effects (SEE) Symposium, La Jolla, CA, April 2012.

(P53) "Analysis of Single-Event Transients in a 45 nm SOI Technology for Rad-Hard Applications, by **D. Loveless**, J. Kauppila, T. Haeffner, T. Holman, M. Alles, B. Bhuva, L. Massengill, S. Jagannathan, N. Gaspard, N. Atkinson, R. Blaine, J. Ahlbin, presented at the 37th Annual Government Microcircuit Applications & Critical Technology Conference (GOMACTech), Las Vegas, NV, March 2012.

(P54) "Design Choices for High Speed Radiation-Hardened Delay-Locked Loops," by Pierre Maillard, **T. Daniel Loveless**, W. Timothy Holman, and Lloyd W. Massengill, presented at the 37th Annual Government Microcircuit Applications & Critical Technology Conference (GOMACTech), Las Vegas, NV, March 2012.

(P55) "Single-Event Hardening Techniques for CMOS Operational Amplifier Design," by R. W. Blaine, N. M. Atkinson, J. S. Kauppila, S. E. Armstrong, **T. Daniel Loveless**, W. Timothy Holman, and Lloyd W. Massengill, presented at the 37th Annual Government Microcircuit Applications & Critical Technology Conference (GOMACTech), Las Vegas, NV, March 2012.

(P56) "Single-Event-Hardened CMOS Operational Amplifier Design," by R. W. Blaine, S. E. Armstrong, N. M. Atkinson, J. S. Kauppila, **T. D. Loveless**, W. T. Holman, and L. W. Massengill, presented at the 12th European Conference on Radiation Effects on Components and Systems (RADECS), Seville, Spain, Sept. 2011.

(P57) "Single-Event Tolerant Flip-Flop Design in 40 nm CMOS Technology," by S. Jagannathan, **T. D. Loveless**, J. R. Ahlbin, B. L. Bhuva, S-J. Wen, R. Wong, M. Sachdev, D. Rennie, and L. W. Massengill, presented at the 2011 Nuclear and Space Radiation Effects Conference (NSREC), Las Vegas, NV, July 2011.

(P58) "Influence of N-Well Contact Area on the Pulse Width of Single-Event Transients," by J. R. Ahlbin, N. M. Atkinson, M. J. Gadlage, N. J. Gaspard, B. L. Bhuva, **T. D. Loveless**, E. X. Zhang, L. Chen, and L.W. Massengill, presented at the 2011 Nuclear and Space Radiation Effects Conference (NSREC), Las Vegas, NV, July 2011.

(P59) "Circuit-Level Layout-Aware Single-Event Sensitive-Area Analysis of 40 nm Bul CMOS Flip-Flops Using Compact Modeling," by J. S. Kauppila, T. D. Haeffner, D. R. Ball, A. V. Kauppila, **T. D. Loveless**, S. Jagannathan, A. L. Sternberg, B. L. Bhuva, and L. W. Massengill, presented at the 2011 Nuclear and Space Radiation Effects Conference (NSREC), Las Vegas, NV, July 2011.

(P60) "Comparison of Combinational and Sequential Error Rates for a Deep Submicron Process," by N. N. Mahatme, S. Jagannathan, **T. D. Loveless**, L. W. Massengill, B. L. Bhuva, S.-J. Wen, R. Wong, presented at the 2011 Nuclear and Space Radiation Effects Conference (NSREC), Las Vegas, NV, July 2011.

(P61) "Impact of Well Structure on Single-Event Well Potential Modulation in Bulk CMOS," by N. J. Gaspard, A. F. Witulski, N. M. Atkinson, J. R. Ahlbin, W. T. Holman, B. L. Bhuva, **T. D. Loveless**, and L. W. Massengill, presented at the 2011 Nuclear and Space Radiation Effects Conference (NSREC), Las Vegas, NV, July 2011.

(P62) "Single-Event Vulnerability of Mixed-Signal Circuit Interfaces in Communication Devices," by S. E. Armstrong, **T. D. Loveless**, R. W. Blaine, N. M. Atkinson, W. T. Holman, and L. W. Massengill, presented at the 20th Annual Single Event Effects (SEE) Symposium, La Jolla, CA, April 2011.

(P63) "A Radiation-Hardened Delay-Locked Loop Design Utilizing Differential Delay Line Topology," by P. Maillard, **T. D. Loveless**, W. T. Holman, and L. W. Massengill, presented at the 20th Annual Single Event Effects (SEE) Symposium, La Jolla, CA, April 2011.

(P64) "Effect of Latchup Mitigation Techniques on Well Potential Modulation and Single-Event-Transient Pulse Widths," by N. J. Gaspard, A. F. Witulski, N. M. Atkinson, J. R. Ahlbin, W. T. Holman, **T. D. Loveless**, B. L. Bhuva, and L. W. Massengill, presented at the 20th Annual Single Event Effects (SEE) Symposium, La Jolla, CA, April 2011.

(P65) "Neutron- and Proton-Induced SEU Error Rates for D- and DICE-Flip/Flop designs at a 40 nm Technology Node," by **T. Daniel Loveless**, S. Jagannathan, T. Reece, J. Chetia, B. L. Bhuva, L. W. Massengill, S-J. Wen, R. Wong, and D. Rennie, presented at the 11th European Conference on Radiation Effects on Components and Systems (RADECS), Sept. 2010.

(P66) "Phase-Dependent Single-Event Sensitivity Analysis of High-Speed A/MS Circuits Extracted from Asynchronous Measurements," by Sarah Armstrong, **Daniel Loveless**, Jonathan Hicks, Dale McMorrow, and Lloyd W. Massengill, presented at the 11th European Conference on Radiation Effects on Components and Systems (RADECS), Sept. 2010.

(P67) "Variables Affecting the Low LET SEU Cross Sections of a 45 nm CMOS SOI SRAM," by **T. D. Loveless**, M. L. Alles, D. R. Ball, K. M. Warren, and L. W. Massengill, presented at the 2010 Nuclear and Space Radiation Effects Conference (NSREC), Denver, CO, July 2010.

(P68) "An RHBD Technique to Mitigate Missing Pulses in Delay Locked Loops," by Pierre Maillard, W. T. Holman, **T. D. Loveless**, B. L. Bhuva, and L. W. Massengill, presented at the 2010 Nuclear and Space Radiation Effects Conference (NSREC), Denver, CO, July 2010.

(P69) "A Generalized Model for Single-Event Analysis and Hardening of Mixed-Signal Phase-Locked Loops," by **T. Daniel Loveless**, Lloyd W. Massengill, W. Timothy Holman, Bharat L. Bhuva, Dale McMorrow, and Jeff Warner, presented at the 19th Annual Single Event Effects (SEE) Symposium, San Diego, CA, April 2010.

(P70) "Experimental Extraction of Phase-Dependent Single-Event Sensitivity," by S. E. Armstrong, **T. D. Loveless**, J. R. Hicks, D. McMorrow, and L. W. Massengill, presented at the 19th Annual Single Event Effects (SEE) Symposium, San Diego, CA, April 2010.

(P71) "An RHBD Technique to Mitigate Missing Pulses in Delay Locked Loops," by Pierre Maillard, W. T. Holman, **T. D. Loveless**, B. L. Bhuva, and L. W. Massengill, presented at the 19th Annual Single Event Effects (SEE) Symposium, San Diego, CA, April 2010.

(P72) "Single-Event Hardening of High-Speed Mixed-Signal Circuits," by **T. Daniel Loveless**, Lloyd W. Massengill, W. Timothy Holman, and Bharat L. Bhuva, presented at the 35th Annual Government Microcircuit Applications & Critical Technology Conference (GOMACTech), Reno, NV, March 2010.

(P73) "Recent Advances in Radiation-Hardened-by-Design Analog and Mixed-Signal Circuits," by W. T. Holman, L. W. Massengill, B. L. Bhuva, A. W. Witulski, and **T. D. Loveless**, presented at the 35th Annual Government Microcircuit Applications & Critical Technology Conference (GOMACTech), Reno, NV, March 2010.

(P74) "Analysis of Single-Event Transients in Integer-N Frequency Dividers and Impacts on Phase-Locked Loop Performance," by **T. D. Loveless**, B. L. Bhuva, W. T. Holman, B. D. Olson, and L. W. Massengill, presented at the 2009 Nuclear and Space Radiation Effects Conference (NSREC), Tucson, AZ, July 2009.

(P75) "Single-Event-Transient Analysis of Delay-Locked Loops," by P. Maillard, **T. D. Loveless**, W. T. Holman, B. L. Bhuva, and L. W. Massengill, presented at the 2008 Nuclear and Space Radiation Effects Conference (NSREC), Tucson, AZ, July 2009.

(P76) "Analysis and Testing of a Radiation Hardened by Design SerDes Transmitter Driver in 90nm CMOS," by S. E. Armstrong, B. D. Olson, J. Popp, J. Braatz, **T. D. Loveless**, W. T. Holman, D. McMorrow, and L. W. Massengill, presented at the 2008 Nuclear and Space Radiation Effects Conference (NSREC), Tucson, AZ, July 2009.

(P77) "Single-Event Effects in Microelectronics Induced by Through-Wafer Sub-Bandgap Two-Photon Absorption," by Dale McMorrow, William T. Lotshaw, Joseph S. Melinger, Jeffrey Warner, Jonathan Pellish, **T. Daniel Loveless**, Sarah E. Armstrong, Robert Reed, and Lloyd W. Massengill, presented at the 2009 Nonlinear Optics: Materials, Fundamentals and Applications (NLO) Conference, Honolulu, HI, July 2009.

(P78) "Analysis and Testing of a Radiation Hardened by Design SerDes Transmitter Driver in 90nm CMOS," by S. Armstrong, J. Popp, J. Braatz, B. D. Olson, **T. D. Loveless**, and L. W. Massengill, presented at the 2009 Single Event Effects (SEE) Symposium, San Diego, La Jolla, CA, April 2009.

(P79) "Single-Event-Transient Analysis of Delay-Locked Loops," by P. Maillard, **T. D. Loveless**, W. T. Holman, B. L. Bhuva, and L. W. Massengill, presented at the 2009 Single Event Effects (SEE) Symposium, San Diego, La Jolla, CA, April 2009.

(P80) "A Radiation-Hardened-by-Design Voltage-Controlled-Oscillator for Mixed-Signal Phase-Locked Loops" by **T. D. Loveless**, L.W. Massengill, B.L. Bhuva, and W.T. Holman, presented at the 2008 Nuclear and Space Radiation Effects Conference (NSREC), Tucson, AZ, July 2008.

(P81) "Laser Verification of On-Chip Charge Collection Measurement Circuit" by O. A. Amusan, P. R. Fleming, B. L. Bhuva, L.W. Massengill, A. F. Witulski, A. Balasubramanian, M. C. Casey, D. Mcmorrow, S. Nation, F. Barsun, J. S. Melinger, M. Gadlage, and **T. D. Loveless**, presented at the 2008 Nuclear and Space Radiation Effects Conference (NSREC), Tucson, AZ, July 2008.

(P82) "A Built-In Self-Test (BIST) Technique for Hardness Assurance against SETs in Digital Circuits" by A. Balasubramanian, B. L. Bhuva, L. W. Massengill, B. Narasimham, R. L. Shuler, **T. D. Loveless**, and W. Timothy Holman, presented at the 2008 Nuclear and Space Radiation Effects Conference (NSREC), Tucson, AZ, July 2008.

(P83) "Single-Event Effects on Combinational Logic Circuits Operating at Ultra-Low Power" by M. C. Casey, O. A. Amusan, S. A. Nation, **T. D. Loveless**, A. Balasubramanian, B. L. Bhuva, R. A. Reed, D. McMorrow, R. A. Weller, M. L. Alles, L. W. Massengill, J. S. Melinger, and B. Narasimham, presented at the 2008 Nuclear and Space Radiation Effects Conference (NSREC), Tucson, AZ, July 2008.

(P84) "Pulsed Laser Single-Event Effects in Highly Scaled CMOS Technologies in the Presence of Dense Metal Coverage" by A. Balasubramanian, D. McMorrow, S. A. Nation, B. L. Bhuva, R. A. Reed, L. W. Massengill, **T. D. Loveless**, O. A. Amusan, J. D. Black, J. S. Melinger, M. P. Baze, V. Ferlet-Cavrois, M. Gaillardin, and J. R. Schwank, presented at the 2008 Nuclear and Space Radiation Effects Conference (NSREC), Tucson, AZ, July 2008.

(P85) "A Radiation-Hardened-by-Design Voltage-Controlled-Oscillator for Mixed-Signal Phase-Locked Loops" by **T. D. Loveless**, L.W. Massengill, B.L. Bhuva, and W.T. Holman, presented at the 2008 Single Event Effects (SEE) Symposium, Long Beach, CA, April 2008.

(P86) "Single-Event Effects Induced by Through-Wafer Sub-Bandgap Two-Photon Absorption," by D. McMorrow, W. T. Lotshaw, J. S. Melinger, P. Jenkins, P. Eaton, J. Benedetto, M. Gadlage, J. D. Davis, R. K. Lawrence, **D. Loveless**, and L. Massengill, presented at the 2007 Nonlinear Optics: Materials, Fundamentals and Applications (NLO) Conference, Kona, Hawaii, July 2007.

(P87) "Mitigation and Modeling of Single-Event Transients in Voltage-Controlled Oscillators," by **T. D. Loveless**, L. W. Massengill, W. T. Holman, and B. L. Bhuva, presented at the 2007 Nuclear and Space Radiation Effects Conference (NSREC), Honolulu, HI, July 2007.

(P88) "A Single-Event-Hardened Phase-Locked Loop Fabricated in 130nm CMOS," by **T. D. Loveless**, L. W. Massengill, B. L. Bhuva, W. T. Holman, R. A. Reed, D. McMorrow, and J. S. Melinger, presented at the 2007 Nuclear and Space Radiation Effects Conference (NSREC), Honolulu, HI, July 2007.

(P89) "Effects of Technology Scaling on the Single-Event-Transient Response of Phase-Locked Loop Circuits," by **T. D. Loveless**, B. L. Bhuva, L. W. Massengill, and W. T. Holman, presented at the 2007 Single Event Effects (SEE) Symposium, Long Beach, CA, April 2007.

(P90) "A Hardened-by-Design Technique for RF Digital Phase-Locked Loops," by **T. D. Loveless**, L. W. Massengill, B. L. Bhuva, W. T. Holman, A. F. Witulski and Y. Boulghassoul, presented at the 2006 Nuclear and Space Radiation Effects Conference (NSREC), Ponte Vedra, FL, July 2006.

(P91) "Hardening Options for a RF Digital PLL," by **T. D. Loveless**, L. W. Massengill, B. L. Bhuva, W. T. Holman, A. F. Witulski, and Y. Boulghassoul, presented at the 2006 Single Event Effects (SEE) Symposium, Long Beach, CA, April 2006.

(P92) "The Effect of Random Dopant Fluctuations (RDF) on the Radiation Hardness of CMOS Memory Cells," by A. Balasubramanian, A.L. Sternberg, P.R. Fleming, B.L. Bhuva, S. Kalemeris, and L.W. Massengill, presented by **T. D. Loveless** at the 2006 Single Event Effects (SEE) Symposium, Long Beach, CA, April 2006.

IX. Teaching Experience

Selected Courses:

Digital Integrated Circuit Design, Analog Integrated Circuit Design, RF Circuit Design, Microelectronic Circuits, Semiconductor Devices, Radiation Effects and Reliability, VLSI, Microprocessor Applications, Embedded Systems, Advanced Electronics

Topics Course (ENGR-E-399/599: VLSI Design), Indiana University

- This course introduces fabrication and layout techniques for designing large-scale integrated circuits. Students use industry-standard tools for designing and fabricating ICs in nanometer-scale technology nodes.
- Enrollment records (previous 2 semesters). Average enrollment of 8 students.
  - 20 *(S2024), 22 (S2025)*
- 1 graduate assistant instructor (AI) (*S2024*).
- Student evaluations available upon request.

Topics Course (ENGR-E-399/599: Microelectronics Radiation Effects and Reliability), Indiana University

- This course overview the fundamentals of radiation effects in microelectronics. Students complete an independent project.
- Enrollment records (previous 2 semesters). Average enrollment of 16 students.
  - *7 (F2023), 24 (F2024), 11 (F2025)*
- Student evaluations available upon request.

Introduction to Engineering (ENEE 1010), University of Tennessee at Chattanooga

- This course introduces core electrical engineering concepts through experiential learning, and modeling, with a focus on electronics, robotics, communications, and energy systems. Modern analysis and design methods are discussed. Review of historical milestones, current trends, and future challenges.
- New course offered for the first time in the Fall of 2019.
- Overall ratings (previous 2 semesters). Average rating of 6.25/7.00.
  - 6.25/7.00 *(F2019)*, 6.5/7.11 *(F2020)*
- Enrollment records (previous 2 semesters). Average enrollment of 44.5 students.
  - 40 *(F2019)*, 49 *(F2020)*
- Student evaluations available upon request.

Circuits I (ENEE 2700), University of Tennessee at Chattanooga

- This course discusses the use of basic electrical circuit element models, signal representations, and circuit analysis methods.
- Implemented major course re-design in the fall semester of 2016 to include the following elements: hybrid-flipped classroom (custom lecture videos, online assignments and tracking, in-class one-on-one help sessions, material re-structuring). As a result, the mean score of the course increased by approximately 10 points when compared to previous two semesters.
- Overall ratings (previous 4 semesters). Average rating of 6.39/7.00.
  - 6.40/7.00 *(F2014),* 6.75/7.00 *(F2015),* 6.01/7.00 *(F2016),* 6.40/7.00 *(F2018)*
- Enrollment records (previous 4 semesters). Average enrollment of 40.3 students.
  - 41 *(F2014),* 36 *(F2015),* 44 *(F2016),* 37 *(F2018)*
- 1 graduate teaching assistant (*F2014*).
- Student evaluations available upon request.

Analog Electronics (ENEE 3720), University of Tennessee at Chattanooga

- This course introduces semiconductors, transistor amplifiers, and operational amplifiers. Analysis techniques for circuits employing semiconductor devices and amplifiers are developed.
- Overall ratings (previous 2 semesters). Average rating of 6.48/7.00.
  - 6.76/7.00 *(S2018),* 6.2/7.00 *(S2019)*
- Enrollment records (previous 2 semesters). Average enrollment of 14.5 students.
  - 12 *(S2018),* 17 *(S2019)*
- Student evaluations available upon request.

Advanced Electronics (ENEE 3770), University of Tennessee at Chattanooga

- This course studies advanced concepts in electronics. Topics include the design of practical and ideal operational amplifier circuits for given transfer functions, the design of active filters, the design of non-linear and pulse shaping circuits, and advanced amplifiers.
- Overall ratings (previous 8 semesters). Average rating of 6.6/7.00.
  - 6.60/7.00 *(S2015),* 6.79/7.00 *(S2016),* 6.92/7.00 *(S2017)*, 6.56/7.00 *(S2018),* 5.81/7.00 *(S2019)*, 6.86/7.00 *(S2020), N/A (S2021), and* 6.81/7.0 *(S2022)*
- Enrollment records (previous 6 semesters). Average enrollment of 15.5 students.
  - 11 *(S2015),* 9 *(S2016),* 24 *(S2017)*, 22 *(S2018)*, 13 *(S2019)*, 14 *(S2020),* 12 *(S2021),* and 17 *(S2022)*
- Student evaluations available upon request.

Advanced Electronics Laboratory (ENEE 3770L), University of Tennessee at Chattanooga

- This laboratory consists of a series of projects in advanced electronics culminating in a major design project, all totally designed by the student.
- Overall ratings (previous 2 semesters). Average rating of 6.54/7.00.
  - 6.54/7.00 *(S2015),* 6.54/7.00 *(S2016)*
- Enrollment records (previous 2 semesters). Average enrollment of 7.5 students.
  - 7 *(S2015),* 8 *(S2016)*
- Student evaluations available upon request.

Embedded Systems (ENEE 4710), University of Tennessee at Chattanooga
Microprocessor Applications (ENEE 4700), University of Tennessee at Chattanooga

- This course discusses practical microprocessor principles, programming, interfacing, *and introduction to FPGA (added to description in F2015, hence course number and name change)*. Design of programs for basic data acquisition and control using the microprocessor as a system component.
- Overall ratings (previous 8 semesters). Average rating of 6.48/7.00.
  - 6.46/7.00 *(F2014),* 6.26/7.00 *(F2015),* 6.81/7.00 *(F2016),* 6.33/7.00 *(F2017),* 6.61/7.00 and 6.20/7.00 *(F2018),* N/A *(F2019)*, N/A and 6.7/7.00 *(F2020)*, 6.8/7.00 (*F2021), in progress (F2022)*
- Enrollment records (previous 8 semesters). Average enrollment of 26.4 students.
  - 28 *(F2014),* 35 *(F2015),* 18 *(F2016),* 28 *(F2017),* 31 *(F2018)*, 17 *(F2019)*, 28 *(F2020)*, 25 (*F2021*), and 14 (*F2022*)
- Student evaluations available upon request

Group Study (ENEE 4999), University of Tennessee at Chattanooga

- Title: Embedded Systems for Space Applications
- This course is a project-based study of real-time operating systems and embedded applications for space systems. Advanced concepts in microprocessors, sensors, and interfacing will be covered.
- Course recognized as meeting experiential learning criteria and delineated for "Beyond the Classroom" credit at UTC, S2016-present.
- Overall ratings (previous 3 semesters). Average rating of 6.34/7.00.
  - 6.34/7.00 *(S2016),* 6.93/7.00 *(S2017), N/A (S2018), N/A (S2019)*
- Enrollment records (previous 3 semesters). Average enrollment of 7.8 students.
  - 9 *(S2016),* 9 *(S2017),* 5 *(S2018),* 8 *(S2019)*
- Student evaluations available upon request.

Group Study (ENEE 4999), University of Tennessee at Chattanooga

- Title: Introduction to Radiation Effects
- This course is a seminar-style collaboration with VU, Purdue, ASU, and others that presents the basics of radiation effects in microelectronics. Students complete independent research and present their work at the SCALE symposium each year.
- Course recognized as meeting experiential learning criteria and delineated for "Beyond the Classroom" credit at UTC, S2020-present.
- Overall ratings (previous 3 semesters). Average rating of N/A.
- Enrollment records (previous 3 semesters). Average enrollment of 7.3 students.
  - 2 *(S2020),* 12 *(S2021),* 8 *(S2022)*
- Student evaluations available upon request.

Small Satellite Research (ENEE 4999), University of Tennessee at Chattanooga

- Title: Small Satellite Research
- Independent undergraduate research in CubeSat small satellite systems.
- Overall ratings (previous 1 semester). Average rating of 7.00/7.00.
  - 7.00/7.00 *(F2018)*
- Enrollment records (previous 1 semester). Average enrollment of 1 student.
  - 1 *(F2018)*
- Student evaluations available upon request.

Individual & Group Study (ENEE 4999), University of Tennessee at Chattanooga
- Title: VLSI Design
- This course is a project-based study of basic theories and techniques of digital and analog VLSI design in CMOS technology. Fundamental concepts and structures of VLSI systems, standard CMOS and bipolar fabrication processes, design rules, interconnect analysis, layout, simulation, and testing are covered.
- Overall ratings (previous 2 semesters). Average rating of 6.71/7.00.
  - 6.71/7.00 *(S2015),* N/A *(F2015)*
- Enrollment records (previous 2 semesters). Average enrollment of 1.5 students.
  - 1 *(S2015),* 1 *(F2015)*
- Student evaluations available upon request.

Advanced Digital Design (ENEE 5150), University of Tennessee at Chattanooga
- This course covers the theoretical and practical aspects of design and implementation of digital circuits. Survey of design entry methods. VLSI and FPGA implementations leveraging hardware description languages. Hardware/software interaction. Projects included.
- Overall ratings (previous 2 semesters). Average rating of N/A/7.00.
  - N/A *(S2019)*
- Enrollment records (previous 2 semesters). Average enrollment of 1.5 students.
  - 2 *(S2019)*
- Student evaluations available upon request.

Microprocessor Applications (ENEE 5700), University of Tennessee at Chattanooga
- This course discusses practical microprocessor principles, programming, interfacing, and introduction to FPGA. Design of programs for basic data acquisition and control using the microprocessor as a system component.
- Overall ratings (previous 5 semesters). Average rating of 6.48/7.00.
  - N/A, (*F2015*), 6.29/7.00 *(F2017)*, 6.67/7.00 *(F2018)*, N/A *(F2019)*, N/A *(F2020)*
- Enrollment records (previous 5 semesters). Average enrollment of 2 students.
  - 2 (*F2015*), 2 (*F2017*), 2 *(F2018)*, 1 *(F2019)*, 3 *(F2020)*
- Student evaluations available upon request.

Group Study (ENEE 5910), University of Tennessee at Chattanooga
- Title: VLSI Design
- This course is a project-based study of advanced theories and techniques of digital and analog VLSI design in CMOS technology. Fundamental and advanced concepts and structures of VLSI systems, standard CMOS and bipolar fabrication processes, design rules, interconnect analysis, layout, simulation, and testing are covered.
- Overall ratings (previous 1 semester). Average rating of N/A/7.00.
  - N/A/7.00 *(F2020)*
- Enrollment records (previous 1 semesters). Average enrollment of 3 students.
  - 3 *(F2020)*
- Student evaluations available upon request.

Group Study (ENEE 5910), University of Tennessee at Chattanooga

- Title: Real-Time Embedded Systems
- This course is a project-based study of real-time operating systems and embedded applications for space systems. Advanced concepts in microprocessors, sensors, and interfacing will be covered. Offered in conjunction with ENEE 4999: Embedded Systems for Space Applications.
- Overall ratings (previous 2 semesters). Average rating of 6.75/7.00.
  - 6.75/7.00 *(S2016),* 6.86/7.00 *(S2018 in progress)*
- Enrollment records (previous 2 semesters). Average enrollment of 4 students.
  - 4 *(S2016),* 4 *(S2018)*
- Student evaluations available upon request.

Individual Study (ENEE 5910), University of Tennessee at Chattanooga

- Title: Advanced Electronics and Integrated Circuits
- This course is a graduate-level course on advanced electronics. Topics include the design of practical and ideal operational amplifier circuits for given transfer functions, the design of active filters, the design of non-linear and pulse shaping circuits. Basic concepts of programmable controllers are discussed. To obtain graduate credit for this course, the student must participate in bi-weekly journal club meetings (to be coordinated with the instructor). The journal club requires each student to suggest a journal article for the group and host a debate. Each student is required to host at least 4 journal club meetings. In each meeting, the host student must provide a brief (no more than 10 minutes) presentation on the important topics of the recommended article, and mediate discussion.
- Overall ratings (previous 1 semester). Average rating of 7.00 /7.00.
  - 7.00/7.00 *(S2015)*
- Enrollment records (previous 1 semester). Average enrollment of 1 student.
  - 1 *(S2015)*
- Student evaluations available upon request.

Group Study (ENEE 5910), University of Tennessee at Chattanooga

- Title: Wireless Embedded Systems
- This course is a graduate-level, project-based course on wireless embedded systems. Students are required to complete a design project and participate in bi-weekly journal club meetings (to be coordinated with the instructor). The journal club requires each student to suggest a journal article for the group and host a debate. Each student is required to host at least 4 journal club meetings. In each meeting, the host student must provide a brief (no more than 10 minutes) presentation on the important topics of the recommended article, and mediate discussion.
- Overall ratings (previous 1 semester). Average rating of 7.00 /7.00.
  - 7.00/7.00 *(S2015)*
- Enrollment records (previous 1 semester). Average enrollment of 2 students.
  - 2 *(S2015)*
- Student evaluations available upon request

Special Topics (ENEE 5910R), University of Tennessee at Chattanooga
- Title: Semiconductor Devices and Semiconductor Optoelectronic Devices
- This course is a graduate-level, independent study of semiconductor device physics. Concepts important for the fabrication and design of integrated semiconductor, optoelectronic, and photonic devices are explored. Knowledge of TCAD tools for device modeling are developed.
- Overall ratings (previous 2 semesters). Average rating of 7.00 /7.00.
  - N/A *(F2016)*, 7.00/7.00 *(F2016)*
- Enrollment records (previous 2 semesters). Average enrollment of 2 students.
  - 1 *(F2016),* 3 *(F2017)*
- Student evaluations available upon request.

Special Topics (ENEE 5910R), University of Tennessee at Chattanooga
- Title: Digital Integrated Circuits
- This course is a graduate-level, independent study of CMOS design and digital integrated circuits.
- Overall ratings (previous 1 semester). Average rating of *N/A.*
  - *N/A (F2018)*
- Enrollment records (previous 1 semester). Average enrollment of 1 student.
  - 1 *(F2018)*
- Student evaluations available upon request.

Introduction to Circuits I (EECE 112), Vanderbilt University
- This course discusses the use of basic electrical circuit element models, signal representations, and circuit analysis methods.
- Overall instructor ratings (6 semesters). Average rating of 4.44.
  - 4.18/5.00 (*Su2009*), 4.27/5.00 *(S2011),* 4.35/5.00 *(F2011)*, 4.50/5.00 *(S2012)*, 4.64/5.00 *(F2012),* 4.45/5.00 *(S2013),* 4.45/5.00 *(F2013)*
- Overall course ratings (6 semesters). Average rating of 4.01.
  - 4.00/5.00 (*Su2009*), 3.77/5.00 *(S2011),* 4.18/5.00 *(F2011)*, 3.74/5.00 *(S2012)*, 4.25/5.00 *(F2012),* 4.00/5.00 *(S2013),* 4.09/5.00 *(F2013)*
- Average Enrollment: 69
- 2 graduate teaching assistants, 3 undergraduate graders
- Student evaluations available upon request

Independent Study (EECE 397), Vanderbilt University
- Title: TID response of RF Devices in a 32 nm PDSOI Technology (*Spring 2013, in progress*)
- Enrollment: 1 graduate student
- Description: S-parameters of devices fabricated in a 32 nm PDSOI technology will be measured. Contributions of parasitic elements will be de-embedded from measurements (optimal methods will be evaluated). Select devices will be irradiated.

Independent Study (EECE 397), Vanderbilt University
- Title: Effects of TID on CMOS LNA Architectures (*Summer 2012*)
- Enrollment: 1 graduate student
- Description: Three types of low-noise amplifiers (narrow band common source, and wide-band resistive and common gate) were used to study RF circuit design concepts and to analyze electrical and radiation performance tradeoffs. Specific topics included the definitions and significance of s-parameters and other critical design parameters, impedance matching using passives networks, design optimization methods, causes and effects of non-linearity, and total ionizing dose response.

Independent Study (EECE 204), Vanderbilt University
- Title: Assembly and Measurement of Advanced Integrated Circuits (*Spring 2012*)
- Enrollment: 2 undergraduate students

Independent Study (EECE 397), Vanderbilt University
- Title: The Design of a 6.25 GHz Quadrature Voltage-Controlled Oscillator in a 45 nm SOI Technology (*Fall 2011*)
- Enrollment: 1 graduate student

Thesis Advisees (37: 25 Concluded, 12 Current)
- Nicholas Atkinson, PhD, Aug. 2013, Vanderbilt University
  - Title: System-Level Radiation Hardening of Low-Voltage Analog/Mixed-Signal Circuits
  - Role: Committee member
- Srikanth Jagannthan, PhD, Nov. 2013, Vanderbilt University
  - Title: TID Characterization of High Frequency RF Circuits in Nano-CMOS Technologies
  - Role: Co-advisor, committee member
- Yanran Paula Chen, MS, Jan. 2014, Vanderbilt University
  - Title: Single-Event Characterization of Digitally-Controlled Oscillators (DCOs)
  - Role: Co-advisor, committee member
- Pierre Maillard, PhD, Jan. 2014, Vanderbilt University
  - Title: Single Event Transient Modeling and Mitigation Techniques for Mixed-Signal Delay Locked Loop (DLL) and Clock Circuits
  - Role: Committee member
- MAJ Raymond Blaine, PhD, Mar. 2014, Vanderbilt University
  - Title : The Design of Single-Event Hardened Analog and Mixed-Signal Circuits
  - Role: Committee member
- Rachel C. Quinn, MS, July 2014, Vanderbilt University
  - Title: Characterization of Single Event Upsets in 32 nm SOI Technology using Alpha Particle and Heavy-ion Radiation Sources
  - Role: Co-advisor, committee member
- Trey Reece, PhD, Dec. 2014, Vanderbilt University
  - Title: Assessing and Detecting Malicious Hardware in Integrated Circuits
  - Role: Committee member
- David McPherson, BS, May 2015, Departmental Honors Program, University of Tennessee at Chattanooga
  - Title: BasketBallBot: Education Level Development of a Fuzzy Controller for a Linear Motor under Saturation Limits
  - Role: Committee member
- Nelson Gaspard, PhD, Mar. 2017, Vanderbilt University
  - Title: Single-Event Upset Technology Scaling Trends of Unhardened and Hardened Flip-Flops in Bulk CMOS
  - Role: Committee member
- Amee Patel, MS, May 2017, University of Tennessee at Chattanooga
  - Title: A Remote-IoT Laboratory for Cyber Physical Systems
  - Role: Advisor
- Yanran Paula Chen, PhD, May 2017, Vanderbilt University
  - Title: Single-Event Effects in All-Digital Phase-Locked Loops
  - Role: Committee member
- Simar Singh, BS, May 2018, Departmental Honors Program, University of Tennessee at Chattanooga
  - Title: Efficacy of Fuzzy Electronics for Space Applications
  - Role: Advisor
- Matthew Joplin, MS, Aug. 2018, University of Tennessee at Chattanooga

        - Title: A Method Characterization of Single-Event Latchup in CMOS Technologies as a Function of Geometric Variation
        - Role: Advisor
    - Mohamed Fadul, MS, Aug. 2018, University of Tennessee at Chattanooga
        - Title: The Impact of Rayleigh Fading Channel Effects on the RF-DNA Fingerprinting Process
        - Role: Committee member
    - Xiaowen Wang, PhD, Aug. 2018, Vanderbilt University
        - Title: Fault-tolerant timing speculation based on circuit dynamic behavior for improved performance and efficiency in digital system
        - Role: Committee member
    - Ryan Boggs, MS, Aug. 2019, University of Tennessee at Chattanooga
        - Title: An Electro-Optical Simulation Methodology for the Analysis of Single-Event Radiation Effects in Photonic Devices
        - Role: Advisor
    - Bharat Patel, MS, Dec. 2019, University of Tennessee at Chattanooga
        - Title: Ionizing Radiation Effects Spectroscopy
        - Role: Advisor
    - Ahmed Ibrahim, MS, Dec. 2019, University of Tennessee at Chattanooga
        - Title: The Manipulation of RF-DNA Fingerprints Through the Use of a Phase-Modulated Clock in IEEE 802.11a Wi-Fi Signals
        - Role: Co-Advisor
    - Delwyn Sam, BS, May 2022, Departmental Honors Program, University of Tennessee at Chattanooga
        - Title: Incorporating in situ measurements of energy into a designed method of detection of radiation induced degradation in embedded systems
        - Role: Advisor
    - Savannah Camp, MS, August 2022, University of Tennessee at Chattanooga
        - Title: Radiation Effects in Heterogeneous Computing Systems (Project)
        - Role: Advisor
    - Stephen Lawrence, MS, May 2023, University of Tennessee at Chattanooga
        - Title: Probabilistic Risk Assessment of System-Level Radiation Effects
        - Role: Advisor
    - Jake Carpenter, MS, June 2023, University of Tennessee at Chattanooga
        - Title: Analysis of Single Event Transients in Arbitrary Waveforms using Statistical Window Analysis
        - Role: Advisor
    - John Lazenby, BS, May 2024, Departmental Honors Program, University of Tennessee at Chattanooga
        - Title: Investigation of PRA for Rapid Part Replacement
        - Role: Advisor
    - Jerald Balta, PhD, May 2025, Indiana University
        - Title: Research in Neutron Spin Rotation, Neutron Cross Section Measurements, and Flexible, Low-Gamma-Radiation Neutron Radiation Shielding
        - Role: Committee member
    - Joshua Tyler, PhD, Aug. 2025, University of Tennessee at Chattanooga
        - Title: Introducing statistical and machine learning-based methods of enhancing the resiliency and security of electrical-based critical infrastructure
        - Role: Committee member
    - Jake Carpenter (PhD), *Current*, Indiana University
        - Title: T.B.D.
        - Role: Advisor
    - Spencer Westfall (PhD), *Current,* Indiana University
        - Title: T.B.D.

    - Role: Advisor
- Jaekon Kim (PhD), *Current*, Indiana University
    - Title: T.B.D.
    - Role: Advisor
- Lucas Nichols (PhD), *Current*, Indiana University
    - Title: T.B.D.
    - Role: Advisor
- John Barney (PhD), *Current*, Indiana University
    - Title: T.B.D.
    - Role: Advisor
- Trevor Peyton (PhD), *Current*, Indiana University
    - Title: T.B.D.
    - Role: Advisor
- Matt McKinney (PhD), *Current*, Indiana University
    - Title: T.B.D.
    - Role: Advisor
- Adam Hubbard (MS), *Current*, Indiana University
    - Title: T.B.D.
    - Role: Advisor
- Hanudeep Marru (MS), *Current*, Indiana University
    - Title: T.B.D.
    - Role: Advisor
- John Burgoon (PhD), *Current*, Indiana University
    - Title: T.B.D.
    - Role: Advisor
- Michael Blacconiere (PhD), *Current*, Indiana University
    - Title: T.B.D.
    - Role: Advisor
- John Lazenby (PhD), *Current*, Indiana University
    - Title: T.B.D.
    - Role: Co-Advisor

Other Advisement and Mentorship (23)

- Ruth Balaji (MS Project), Indiana University
    - Role: Advisor/Supervisor
- Isaac Hudson (MS Project), Indiana University
    - Role: Advisor/Supervisor
- Jacob Pew, MS Project, University of Tennessee at Chattanooga
    - Role: Advisor/Project Mentor
- Ryan Young, MS Project, May 2024, University of Tennessee at Chattanooga
    - Role: Advisor/Project Mentor
- Rachel C. Quinn, PhD, May 2019, Vanderbilt University
    - Title: Models for Characterizing Single-Event Effects in Advanced Technology Circuits
    - Role: Mentor
- Jeffrey A. Maharrey, MS, May 2014, Vanderbilt University
    - Title: Characterization of Heavy-Ion Induced Single Event Transients in 32nm and 45nm Silicon-on-Insulator Technologies
    - Role: Co-advisor, mentor
- Ellis Richards, Undergraduate Research Assistant, S2016, University of Tennessee at Chattanooga
    - Title: Radiation Effects in Photonic Integrated Circuits
    - Role: Advisor
- Josh Chapman, Undergraduate Research Assistant, S2016, University of Tennessee at Chattanooga

    - Title: Autonomous Rail Transport Vehicle
    - Role: Advisor
  - William Garner, undergraduate research, F2017-S2018, University of Tennessee at Chattanooga
    - Title: A Mobile and Small-Scale EEG for Tracking Mental Health Tracking in Athletic and Urban Environments
    - Role: Advisor
  - Artem Malashiy, undergraduate research, Su2018-S2019, University of Tennessee at Chattanooga
    - Title: UTChattSat: Undergraduate Research in Small Satellite Systems
    - Role: Advisor
  - Nathaniel Elmore, undergraduate research, F2018, University of Tennessee at Chattanooga
    - Title: UTChattSat: Undergraduate Research in Small Satellite Systems
    - Role: Advisor
  - Diego Amaro, undergraduate research, Su2019-Aug. 2021, University of Tennessee at Chattanooga
    - Title: UTChattSat: Undergraduate Research in Small Satellite Systems
    - Role: Advisor
  - Berkay Dean, undergraduate research, Su2019-May 2022, University of Tennessee at Chattanooga
    - Title: UTChattSat: Undergraduate Research in Small Satellite Systems and Radiation Effects
    - Role: Advisor
  - Jacob Pew, undergraduate research, Su2021-S2022, University of Tennessee at Chattanooga
    - Title: Undergraduate Research in Radiation Effects
    - Role: Advisor
  - John Lazenby, undergraduate research, S2021-Su2023, University of Tennessee at Chattanooga
    - Title: Undergraduate Research in Radiation Effects
    - Role: Advisor
  - Jaekeon Kim, undergraduate research, Su2021-S2022, University of Tennessee at Chattanooga
    - Title: Undergraduate Research in Radiation Effects
    - Role: Advisor
  - David DeBerry, undergraduate research, Su2021-S2022, University of Tennessee at Chattanooga
    - Title: Undergraduate Research in Radiation Effects
    - Role: Advisor
  - Cameron Moyers, undergraduate research, Su2021-S2022, University of Tennessee at Chattanooga
    - Title: Undergraduate Research in Radiation Effects
    - Role: Advisor
  - Adam Peterson, undergraduate research, Su2021-S2022, University of Tennessee at Chattanooga
    - Title: Undergraduate Research in Radiation Effects
    - Role: Advisor
  - John Barney, undergraduate research, F2021-Su2023, University of Tennessee at Chattanooga
    - Title: Undergraduate Research in Radiation Effects
    - Role: Advisor
  - Lucas Nichols, undergraduate research, F2021-Su2023, University of Tennessee at Chattanooga
    - Title: Undergraduate Research in Radiation Effects
    - Role: Advisor

- Trevor Peyton, undergraduate research, F2021-Su2023, University of Tennessee at Chattanooga
  - Title: Undergraduate Research in Radiation Effects
  - Role: Advisor
- Hope Hunnicutt, undergraduate research, F2021-present, University of Tennessee at Chattanooga
  - Title: Undergraduate Research in Radiation Effects
  - Role: Advisor

X. Honors, Awards, Service, and Outreach

Honors and Awards

- Recipient of Guerry Professorship, University of Tennessee at Chattanooga, June 2021.
- Recipient of the 2019 IEEE Nuclear Plasma and Sciences Society (NPSS) Radiation Effects Early Achievement Award for contributions radiation effects research in high-speed analog and mixed-signal electronics and student mentorship in the radiation effects community.
- Best student poster award (2nd place), ASEE Southeastern Section Annual Conference, 2018, "The Response of Fuzzy Electronics to Ionizing Radiation," S. Singh, T. D. Loveless.
- Best student poster award (2nd place), 52nd Annual Conference of the National Collegiate Honors Council (NCHC), 2017, "Efficacy of Fuzzy Electronics in Space," S. Singh, T. D. Loveless.
- Named UC Foundation Assistant Professor in recognition of distinguished service as faculty member at UTC, Apr. 2017.
- Recipient of 2016 GigTank365 Summer Fellowship (UTChattSat), *CO.LAB*, Chattanooga, TN, May-July 2016.
- STEM Category Winner in Faculty Elevator Speech Competition, "Rocket Scientist, Engineer, Educator," *UTC's Research Dialogues*, Apr. 2016.
- Outstanding Researcher Award, Electrical Engineering, University of Tennessee at Chattanooga, 2015-2016, 2016-2017, 2020-2021.
- Received highest ranking of "Exceeds Expectations" seven years in a row for service, teaching, and research activities at the University of Tennessee at Chattanooga, 2014-2015, 2015-2016, 2016-2017, 2017-2018, 2018-2019, 2019-2020, and 2020-2021.
- Elevated to Senior Member, IEEE, June 2015.
- Best student poster award, 37th Annual Government Microcircuit Applications & Critical Technology Conference (GOMACTech), 2012, "Single-Event Hardening Techniques for CMOS Operational Amplifier Design," Raymond W. Blaine, Nicholas M. Atkinson, Jeffrey S. Kauppila, Sarah E. Armstrong, T. Daniel Loveless, W. Timothy Holman, and Lloyd W. Massengill.
- Best poster award, 2011 International Reliability Physics Symposium (IRPS), "Neutron and Alpha Particle Induced Soft-Error Rates for Flip Flops at a 40 nm Technology Node," Srikanth Jagannathan, T. D. Loveless, T. Reece, B. L. Bhuva, S-J. Wen, R. Wong, L. W. Massengill.
- Best paper award, 35th Annual Government Microcircuit Applications & Critical Technology Conference (GOMACTech), 2010, "Recent Advances in Radiation-Hardened-by-Design Analog and Mixed-Signal Circuits," W.T. Holman, L.W. Massengill, B.L. Bhuva, A.F. Witulski, and T.D. Loveless.
- Recipient of the 2008 IEEE Nuclear Plasma and Sciences Society (NPSS) Graduate Scholarship Award for contributions to the fields of Nuclear and Plasma Sciences, March 2008.

Outreach

- Defend the Republic High School Drone Competition (Sponsor), IU Bloomington, Nov. 2024.

- POLSIR: Middle School Science Curriculum Development, SCALE K-12, West Lafayette, IN, May-July 2024.
- Project mentor for two 11th grade students from the Baylor School, "A CubeSat Reaction-Wheel-Based Attitude Control System and Demonstration Gimbal," Jan. 2018- July 2023.
- Project mentor for one 11th grade student from the Baylor School, "The Use SUAVs for Attacking Malaria," Jan. 2018-June 2018.
- Project sponsor for thirty 11th grade students from the Baylor School, "The Use SUAVs for Attacking Malaria," Oct.-Dec. 2017.
- Project mentor for nine 11th grade students from the STEM High School Fab Lab, "Mitigating Cold-Temperature Effects in High-Altitude Balloon Payloads," Oct.-Dec. 2016.
- Panelist, The Baylor School Accelerator's Entrepreneurial Panel, "How to Develop an Idea," Nov. 2016.
- "The Martian" and "UTChattSat: Engineering for Outer Space in the Classroom," Outreach Presentations at the Chattanooga Girls Leadership Academy, Chattanooga, TN, Apr. 19, 2016 and Oct. 6, 2016.
- "Minimum Size and Maximum Packing Density of Nonredundant Semiconductor Devices," Baylor School Journal Club, Feb. 21, 2016.
- Established relationships with Hamilton County Department of Education, the Chattanooga Girls Leadership Academy, and the UTC Challenger STEM Learning Center for development of space science curriculum, Aug. 2015- July 2023.
- Mentor for one East Ridge High School Senior project in electrical engineering, Jan.-May 2015.
- Volunteer for the School for Science and Math at Vanderbilt, a joint venture between Vanderbilt University Medical Center and Metropolitan Nashville Public Schools (MNPS), 2011-2014.
  - Sophomore project mentor, 2012-2013: 1) Microcontoller-driven autonomous bridge inspection bot, 2) Microcontoller-driven autonomous soil moisture measurements through electromagnetic induction, 3) A sense-capacitor-based virus detection circuit, 4) A nano-pipette through electrolysis
  - Engineering panel for Remote Sensing Design Day, 11/20/13

Service

- Chair, ME Design MS Proposal Committee, Intelligent Systems Department, Luddy School for Informatics, Computing, and Engineering, Indiana University Bloomington, Aug. 2025-present.
- Chair of F100 Faculty Hiring Committee (4 positions), Intelligent Systems Department, Luddy School for Informatics, Computing, and Engineering, Indiana University Bloomington, Aug. 2025-present.
- ISE Admissions Committee, Intelligent Systems Department, Luddy School for Informatics, Computing, and Engineering, Indiana University Bloomington, Aug. 2024-present.
- Graduate Curriculum Committee, Intelligent Systems Department, Luddy School for Informatics, Computing, and Engineering, Indiana University Bloomington, Nov. 2023-July 2024.
- F100 Faculty Hiring Committee (5 positions), Intelligent Systems Department, Luddy School for Informatics, Computing, and Engineering, Indiana University Bloomington, Oct. 2023-Aug. 2025.
- Member of the LGBTQ+ Staff & Faculty Council, Indiana University Bloomington, Sept. 2023-present.
- ME Design Task Force, Intelligent Systems Department, Luddy School for Informatics, Computing, and Engineering, Indiana University Bloomington, Aug. 2023-present.
- Executive Steering Committee, NASA Single-Event Effects Symposium and Military and Aerospace Programmable Logic Devices Workshop, Apr. 2023-present.
- Associate Editor, IEEE Transactions on Nuclear Science, May 2021-present.

- General Chair, 2023 NASA Single-Event Effects Symposium, La Jolla, CA, Oct. 2022-Apr. 2023.
- Technical Program Chair, 2022 NASA Single-Event Effects Symposium, La Jolla, CA, Oct. 2021-May 2022.
- Local Arrangements Chair, 2022 IEEE Nuclear and Space Radiation Effects Conference, Provo, Utah, Aug. 2020-July 2022.
- Finance Chair, 2020 IEEE Nuclear and Space Radiation Effects Conference, Santa Fe, New Mexico, Aug. 2018-July 2021.
- Session chair: 2023 GOMACTech, San Diego, CA, Mar. 2023, 2022 GOMACTech, Miami, FL, Mar. 2022, 2014 Nuclear and Space Radiation Effects Conference (Single-Event Effects: Devices and ICs), Paris, FR, July 2014, and 2012 Single Event Effects Symposium, La Jolla, CA, April 2012.
- Chair, Electrical Engineering Department Reappointment, Tenure, and Promotion (RTP) Committee, Aug. 2019-July 2020.
- Undergraduate Petitions Committee, UTC, Aug. 2017-July 2018.
- CECS Outreach and Research Committee, UTC, Jan. 2017-July 2023.
- High Impact Practices Grant Committee, UTC, Aug. 2016- July 2023.
- Chair, Research Technology Sub-Committee (IT Governance), UTC, Jan. 2018-July 2019.
- IT Governance Council, UTC, Nov. 2017-July 2019.
- Reviewer, Promoting Equity and Diversity on Campus, UTC, Sept. 2017.
- UTC General Education Steering Committee, UTC, Jan. 2017-July 2017.
- Search Committees: Director of Student Success, Electrical Engineering Faculty (2), 2016-2017, Director of the SimCenter (2017), Chemical Engineering Faculty (2018), UTC, Electrical Engineering Department Head (2020).
- Awards committee, 2016 IEEE Nuclear and Space Radiation Effects Conference, Portland, OR.
- Led the UTC Electrical Engineering Department's efforts in 2015-2016 ABET re-accreditation cycle. Established college-wide methodology for student outcome assessment, Nov. 2015.
- Community liaison for the College of Engineering and Computer Science (CECS) Electrical Engineering Department, UTC, Oct. 2015-present.
- Chair, UTC College of Engineering and Computer Science (CECS) ABET Taskforce Committee, 2015-2016.
- UTC Departmental Honors Committee, Sept. 2015-Aug. 2016.
- Participant in UTC Roundtable with Bruce Katz, Vice President and Founding Director of the Brookings Institute, Sept. 2015.
- Mentor and Participant on UTC Fellowship Team for 2015 GigTank (boutique accelerator for seed-stage startups developing ultra high-bandwidth business), Chattanooga, TN, June-Aug. 2015.
- Involved in UTC EE Department recruitment efforts at Chattanooga State Community College, Dalton State Community College, and Cleveland State Community College, 2014-present.
- Faculty co-advisor for IEEE, UTC, 2014-2023.
- Faculty advisor for IEEE Eta Kappa Nu (HKN) Student Honor Society, Epsilon Lambda Chapter (Vanderbilt University), 2013-2014.
- Faculty advisor for IEEE Vanderbilt, 2012-2014.
  - Started microcontroller design group, Oct. 2013.
  - Hosted Arduino "Speed Build" competition, Nov. 2013.
- Reviewer for *IEEE TDMR* (2013), *IEEE RADECS* (2013, 2015, 2018, 2021, 2023, 2024) *IEEE NSREC* (2013-present), *HEART Conference* (2011, 2014, 2015, 2016), *Journal of Electronic Testing: Theory and Applications* (2011), *IEEE Sensors* (2010-present), *IEEE NSREC Data Workshop* (2009), *IET Electronics Letters* (2009-present), *Elsevier Microelectronics Reliability* (2017-present), *IEEE Transactions on Nuclear Science* (2008-present).

Professional Development

- Aspiring SafeZone Training (4 professional development hours), Dec. 2021.
- Mentor Collective Training (2 professional development hours), Aug. 2020.
- Activity Insight Training, (1.5 professional development hours), Nov. 2017.
- MyMediaSite Training, (1 professional development hour), Aug. 2015.
- NSF Grants Conference (16 professional development hours), May 2015.
- Early adopter of the EAB Student Success Collaborative tool for student advisement, Sept. 2015-present.
- ABET Fundamentals of Program Assessment Workshop (7 professional development hours), Baltimore, MD, Nov. 2014.
- Hosted MathWorks MATLAB/Simulink and RaspberryPi Workshop (5 professional development hours), UTC, Chattanooga, TN, Nov. 2014.
- OU Campus Website Training (2 professional development hours), Sept. 2014.

Professional Organizations/Certifications

- Senior Member, IEEE TN Branch: 2000–present.
  - IEEE Nuclear Plasma Sciences Society, 2007–present.
  - IEEE Circuits and Systems Society, 2007–present.
  - IEEE Solid-State Circuits Society, 2015–present.
  - IEEE Young Professionals, 2014–present.
  - IEEE Smart Grid Community, 2014–present.
  - IEEE Software Defined Networks Community, 2014–present.
  - IEEE Transportation Electrification Community, 2014–present.
- Member, ASEE: 2017-present.
- EIT Certification, 2005.

Other Honors or Activities

- Recipient of the Georgia Tech Alumni Association Scholarship (2000–2004).
- Study Abroad–Metz, France: Georgia Institute of Technology, May–July 2004.
- Faculty Honors (semester 4.0 GPA): Georgia Institute of Technology, 2003.
- Eta Kappa Nu ECE Honor Society, Georgia Institute of Technology, 2003.
- Dean's List: Georgia Institute of Technology, Aug. 2000–July 2004.