Argenis Bilbao

Texas Tech University
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MS 2007
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Education

Doctor of Philosophy in Electrical Engineering, Texas Tech University, Aug. 2016
Dissertation Title: "Continuous Switching Reliability of Ultra-High Voltage SiC MOSFETs and IGBTs"

Master of Science in Electrical Engineering, Texas Tech University, 2015

Bachelor of Science in Electrical Engineering, Texas Tech University, 2011

Work Experience

GLEAMM Senior Director, Texas Tech University, May 2021-Present

Primary responsibilities:

- GLEAMM staff management.
- Mentoring and management of graduate student's research projects.
- Lead research activities conceived by the TTU faculty and research staff involving the GLEAMM facility.
- Develop independent research initiatives with federal agencies, other universities and the private sector.

Electronics Engineer, Army Research Laboratory (ARL), Feb 2018-Apr 2021

Primary responsibilities:

- Technical Area lead for inductive-resonant wireless power transfer program.

- Perform fundamental research in novel uses of machine learning applied to power electronic systems.

- Develop algorithms for SMART power devices.

- Conduct research on power semiconductor devices for defense applications.

Research Assistant Professor/Post Doc, Texas Tech University, Jun. 2016-Feb 2018

Primary responsibilities:

- Supervise graduate students performing analysis and testing of ultra-high voltage SiC power semiconductor devices.

- Supervise and direct the deployment of a grid-tied 150 kW solar panel array.

- Design and implement a research microgrid.

- Deploy and oversee students maintaining phasor measurement unit network in conjunction with industry partners, universities, and national laboratories.

- Oversee the deployment of an Opal-RT training center for simulation of power grids, microgrids, and power electronic control algorithms.

- Work with industry partners to deploy battery testing equipment for Group NIRE.

- Supervise students performing research on control mechanisms for using fuel cells as distributed energy resources in microgrids.

Graduate Research Assistant / Teaching Assistant, Pulsed Power and Power Electronics Lab, 2010-2016

Primary responsibilities:

- Analyze and characterize failure modes of ultra-high voltage silicon carbide power semiconductor devices.

- Perform semiconductor device simulation models for failure analysis.

- Design high voltage power electronics and testbeds capable of testing devices at voltages up to 45 kV.

- To develop diagnostic hardware to study the wake effects on power output of wind turbines.

- Write software for a set of custom-built phasor measurement units to serve as an educational tool for wind science students.

- To develop a new sensor platform used for remote structural health monitoring.

- Instruct courses, grade, and assign corresponding grades to students.

Electrical Engineering Intern at the Sandia National Laboratories (SNL), summer 2012

Primary responsibilities:

- Develop signal conditioning algorithms for wind turbine applications using LabVIEW.

- To perform signal filtering and implement error correction algorithms on data obtained from sonic wind speed sensors.

Undergraduate Research Assistant, Pulsed Power and Power Electronics Lab, 2008-2010

Primary responsibilities:

- To develop firmware for a multi-stage, multi-level, three-phase inverter using the C programming language.

- Perform hardware tests to analyze and troubleshoot synchronization issues occurring in the inverter.

Programmer, Ofinet Dominicana, 2003-2004

Primary responsibilities:

- Develop web-based management systems for broadcasting companies to facilitate their interactions with customers.

- To debug and improve existing web-based advertisement submission systems.

Programmer, Daniel Espinal, 2002-2003

Primary responsibilities:

- Writing budgeting, accounting, inventory, and accounting reporting software.

- To perform computer hardware repair and troubleshooting for employees.

Awards and Recognitions

- Dean's List, 2009
- Recipient of the "Sybil B Harrington Living Trust" scholarship, 2010
- Second place winner of the "Region 5 IEEE Student Paper Competition", 2011
- "ARL Customer Service Award", 2019

Teaching Experience

Course Number	Description	Semester
ECE3362	Microcontrollers	Spring 2020
ECE4316/5316	Power Electronics	Fall 2019
ECE3362	Microcontrollers	Spring 2019
ECE4316/5316	Power Electronics	Spring 2018
ECE3362	Microcontrollers	Spring 2017
ECE3332/ECE3334	Project Laboratory II	Spring 2016
ECE3332/ECE3334	Project Laboratory II	Spring 2015
ECE3362	Microcontrollers	Fall 2012
ENGR1315	Introduction to Engineering	Fall 2012
ECE3362	Microcontrollers	Spring 2012
ECE3332/ECE3334	Project Laboratory II	Fall 2011

Extracurricular Activities

Research for Undergraduate (REU) Mentor	Summer 2017
Research & Engineering Apprenticeship Program Mentor	Summer 2015
Research for Undergraduate (REU) Guide	Summer 2015
Research & Engineering Apprenticeship Program Mentor	Summer 2014
Research for Undergraduate (REU) Mentor	Summer 2014

Cool STEAM Guide	October 2014
Research & Engineering Apprenticeship Program Mentor	Summer 2013
Research & Engineering Apprenticeship Program Mentor	Summer 2012

Synergistic Activities

- Second place winner on the IEEE Region 5 student paper competition in 2011
- Conference publication reviewer, TPEC, Dec. 2016
- Developed a set of synchrophasor measurement units used as an educational tool for a newly developed graduate-level wind science class, 2016
- Participated as a mentor for prospective engineering students through the Research & Engineering Apprenticeship Program (REAP), 2016
- Obtained first place in the patent poster presentation for the Global Laboratory for Energy Asset Management (GLEAMM) challenge, 2017
- Journal publication reviewer, Transactions on Power Electronics, Aug. 2017
- Journal publication reviewer, Transactions on Plasma Science, Jun. 2019
- Served as the Chair for technical sessions 10.1/10.2 titled "Converters, Components, Magnetics, Switches and Capacitors" in the 2019 IEEE Pulsed Power and Plasma Science Conference
- Journal publication reviewer, Transactions on Plasma Science, Aug. 2020

Graduate Committees Served

Travis Huffmaster	Electrical Engineering, MS, Spring 2018
Gail Alleyne-Bayne	Education, Ph.D., Summer 2017
James A. Schrock	Electrical Engineering, Ph.D., Spring 2017
Santiago Novoa	Electrical Engineering, MS, Spring 2017

Invited Talks

"Micro-grid and Distributed Energy Resources", National Wind Institute, Lubbock, TX, Sep. 2017

"Microgrid and Distributed Energy Resources for Defense", Operational Energy Summit, Washington, DC, Jan. 2017

"Advanced, Intelligent Control of Power Semiconductor Modules", U.S. Army Research Laboratory, (Virtual) Jun. 2020

Funded Projects

- “Supporting the Global Laboratory for Energy Asset Management & Microgrid”, State of Texas, Total amount: **$341,000**
- “Support Advanced Energy Research”, Group NIRE, Total amount: **$125,497**
- “Wind Farm Usage Optimization based on Utility Market Pricing and Reliability Study of Electrical Distribution System”, Pantex, Total amount: **$90,000**
- “Reliability Analysis of Wide Band Gap Power Devices”, PowerAmerica, Total amount: **$199,417**

Presentations

1. "PSPICE modeling of silicon carbide MOSFETs and device parameter extraction," in IEEE Power Modulator and High Voltage Conference, San Diego, CA, 2012

2. "Pulsed power switching of 4H-SiC vertical D-MOSFET and device characterization," in IEEE Pulsed Power Conference, San Francisco, CA, 2013

3. "Digital control of a rapid capacitor charger with sensor-less voltage feedback," in IEEE International Power Modulator and High Voltage Conference, Santa Fe, NM, 2014

4. "Analysis of advanced 20 kV/20 A silicon carbide power insulated gate bipolar transistor in resistive and inductive switching tests," in IEEE Pulsed Power Conference, Austin, TX, 2015

5. “Continuous switching of ultra-high voltage silicon carbide MOSFETs,” in IEEE International Power Modulator and High Voltage Conference, San Francisco, CA, 2016

6. “Compact Rapid Capacitor Charger for Mobile Marx Generator Applications,” in IEEE Pulsed Power Conference, Orlando, FL, 2019

Patents

S Lacouture, A Bilbao, S Bayne, “Magnetic field vector imaging array”, US Patent 10,393,827, Aug. 27th 2019

Journal Publications

1. D. P. Hoover, A. Bilbao, and J. A. Rice, "WiSeMote: a novel high fidelity wireless sensor network for structural health monitoring," Smart Structures and Systems, vol. 10, no. 3, pp. 271-298, 2012

2. A. V. Bilbao, J. A. Schrock, W. B. Ray, M. D. Kelley, S. L. Holt, M. G. Giesselmann, and S. B. Bayne, "Development and testing of an active high voltage saturation probe for characterization of ultra-high voltage silicon carbide semiconductor devices," Review of Scientific Instruments, vol. 86, pp. 85-104, 2015

3. M. G. Giesselmann and A. Bilbao, "Digital control of a rapid capacitor charger with sensor-less voltage feedback," IEEE Transactions on Dielectrics and Electrical Insulation, vol. 22, no. 4, pp. 1930-1936, Aug. 2015

4. J. A. Schrock, W. B. Ray, K. Lawson, A. Bilbao, S. B. Bayne, S. L. Holt, L. Cheng; J. W. Palmour, and C. Scozzie, "High-mobility stable 1200-V, 150-A 4H-SiC DMOSFET long-term reliability analysis under high current density transient conditions," IEEE Transactions on Power Electronics, vol. 30, no. 6, pp. 2891-2895, Jun. 2015

5. J. A. Schrock et al., "Failure modes of 15-kV SiC SGTO thyristors during repetitive extreme pulsed overcurrent conditions," IEEE Transactions on Power Electronics, vol. 31, no. 12, pp. 8058-8062, Dec. 2016

6. J. A. Schrock, B. N. Pushpakaran, A. V. Bilbao, W. B. Ray, E. A. Hirsch, M. D. Kelley, S. L. Holt, and S. B. Bayne, "Failure Analysis of 1200-V/150-A SiC MOSFET Under Repetitive Pulsed Overcurrent Conditions," IEEE Transactions on Power Electronics, vol. 31, no. 3, pp. 1816-1821, Mar. 2016

7. N. Shamim, S. S. Noureen, A. Bilbao, A. S. Subburaj, and S. Bayne. "A Comparative Study of Vector Control and Model Predictive Control Technique for Grid Connected Battery System" International Journal of Research and Engineering, vol. 5.1, pp. 287-295, Feb. 2018

8. M. D. Kelley, B. N. Pushpakaran, A. V. Bilbao, J. A. Schrock, S. B. Bayne, “Single-pulse avalanche mode operation of 10-kV/10-A SiC MOSFET”, Microelectronics Reliability, vol. 81, pp. 174-180, 2018

Conference Publications

1. A. Bilbao, D. Hoover, J. Rice, and J. Chapman, "Ultra-low power wireless sensing for long-term structural health monitoring," in SPIE 7981 Proceedings, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2011, San Diego, CA, 2011

2. D. Hoover, A. Bilbao, and J. A. Rice, “A low power, low noise wireless sensor platform for structural health monitoring,” in 6th EWSHM Proceedings, Dresden, Germany, 2012, pp. 936-1691

3. A. Bilbao and S. Bayne, "PSPICE modeling of silicon carbide MOSFETS and device parameter extraction," in 2012 IEEE Power Modulator and High Voltage Conference (IPMHVC), San Diego, CA, 2012, pp. 776-779

4. L. Cheng, A. K. Agarwal, M. Schupbach, D. A. Gajewski, D. J. Lichtenwalner, V. Pala, R. Sei-Hyung, J. Richmond, J. W. Palmour, W. Ray, J. Schrock, A. Bilbao, S. Bayne, A. Lelis, and C. Scozzie, "High performance, large-area, 1600 V / 150 A, 4H-SiC DMOSFET for robust high-power and high-temperature applications," in 2013 International Symposium on Power Semiconductor Devices and ICs (ISPSD), Kanazawa, 2013, pp. 47-50

5. A. Bilbao, W. B. Ray, J. A. Schrock, K. Lawson, S. B. Bayne, L. Cheng; A. K. Agarwal, and C. Scozzie, "Pulsed power switching of 4H-SiC vertical D-MOSFET and device characterization," in 2013 IEEE Pulsed Power Conference (PPC), San Francisco, CA, 2013, pp. 1-4

6. S. Pol, A. Taylor, A. Bilbao, A. Doostalab, S. Novoa, C. Westergaard, F. Hussain, J. Sheng, B. Ren, M. Giesselmann, M. Glauser, and L. Castillo, "Field measurements in the wake of a model wind turbine," in Journal of Physics: Conference Series, vol. 524, 2014, pp. 12-175

7. M. G. Giesselmann and A. Bilbao, "Digital control of a rapid capacitor charger with sensor-less voltage feedback," in 2014 IEEE International Power Modulator and High Voltage Conference (IPMHVC), Santa Fe, NM, 2014, pp. 640-643

8. A. Taylor, S. Pol, A. Doosttalab, S. Novoa, L. Castillo, J. Sheng, A. Bilbao, M. Giesselmann, C. Westergaard, and F. Hussain, "Summary of Smart Wind Farm Array Activities for Summer Research Institute, 2013," in NWRC Summer Research Institute Proceedings in Renewable Energy, Turbulence & Medicine, National Wind Resource Center, Issue 1, 2014, pp. 1-5

9. M. D. Kelley, A. V. Bilbao, W. B. Ray, J. A. Schrock, and S. B. Bayne, "Evaluation and comparison of 1200-V/285-A silicon carbide half-bridge MOSFET modules," in 2015 IEEE Pulsed Power Conference (PPC), Austin, TX, 2015, pp. 1-4

10. W. B. Ray, J. A. Schrock, A. V. Bilbao, M. Kelley, S. Lacouture, E. Hirsch, and S. B. Bayne, "Analysis of GaN power MOSFET exporsure to pulsed overcurrents," in 2015 IEEE Pulsed Power Conference (PPC), Austin, TX, 2015, pp. 1-5
11. J. A. Schrock, W. B. Ray, A. V. Bilbao, M. D. Kelley, W. A. Hirsch, S. L. Holt, and S. B. Bayne, "Development of secondary breakdown circuit for dv/dt analysis of SiC devices," in 2015 IEEE Pulsed Power Conference (PPC), Austin, TX, 2015, pp. 1-5

12. M. G. Giesselmann, A. Bilbao, "Protective networks for high voltage power supplies for pulsed power loads," in 2015 IEEE Pulsed Power Conference (PPC), Austin, TX, 2015, pp. 1-6

13. A. V. Bilbao, J. A. Schrock, W. B. Ray, M. D. Kelley, S. B. Bayne, "Analysis of advanced 20 KV/20 A silicon carbide power insulated gate bipolar transistor in resistive and inductive switching tests," in 2015 IEEE Pulsed Power Conference (PPC), Austin, TX, 2015, pp. 1-3

14. E. Hirsch, J. A. Schrock, S. Lacouture, A. Bilbao, S. Bayne, M. Giesselmann, H. O'Brien, and A. Ogunniyi, “Evaluation of long term reliability and safe operating area of 15 kV SiC PiN diodes during ultra-high current pulsed conditions,” in 2016 IEEE International Power Modulator and High Voltage Conference (IPMHVC), San Francisco, CA, 2016

15. J. A. Schrock, E. Hirsch, A. Bilbao, S. Lacouture, W. Ray, S. Bayne, M. Giesselmann, H. O'Brien, and A. Ogunniyi, “Simulation and design trade-off analysis of 15 kV SiC SGTO thyristor during extreme pulsed overcurrent conditions,” in 2016 IEEE International Power Modulator and High Voltage Conference (IPMHVC), San Francisco, CA, 2016

16. A. V. Bilbao, J. A. Schrock, M. D. Kelley, E. Hirsch, W. B. Ray, S. B. Bayne, and M. G. Giesselmann, “Continuous switching of ultra-high voltage silicon carbide MOSFETs,” in 2016 IEEE International Power Modulator and High Voltage Conference (IPMHVC), San Francisco, CA, 2016

17. W. B. Ray, M. Kim, A. Bilbao, J. A. Schrock and S. B. Bayne, "Analysis on repetitive pulsed overcurrent operation of GaN power transistors," 2016 IEEE 4th Workshop on Wide Bandgap Power Devices and Applications (WiPDA), Fayetteville, AR, 2016, pp. 353-356.

18. A. V. Bilbao, M. G. Giesselmann and S. B. Bayne, "Charge transfer-based sensorless voltage feedback in HV capacitor chargers," 2016 IEEE International Power Modulator and High Voltage Conference (IPMHVC), San Francisco, CA, 2016, pp. 397-399

19. M. Kim et al., "Analysis on repetitive pulsed overcurrent operation of GaN power transistors," 2017 IEEE 21st International Conference on Pulsed Power (PPC), Brighton, 2017, pp. 1-4

20. M. Kim, J. J. Forbes, A. V. Bilbao, J. A. Schrock and S. B. Bayne, "Reconfigurable High Voltage Load for Pulsed Power Applications," 2017 IEEE 21st International Conference on Pulsed Power (PPC), Brighton, 2017, pp. 1-3

21. Shamim, Nimat & Noureen, Subrina & Bilbao, Argenis & Subburaj, Anitha & Bayne, Stephen. (2018). A Comparative Study of Vector Control and Model Predictive Control Technique for Grid Connected Battery System. International Journal of Research and Engineering. 4. 287-295. 10.21276/ijre.2018.5.1.1.

22. N. Shamim, A. Bilbao, D. Reale and S. Bayne, "Analysis of Grid Connected Fuel Cell Power System Integrated with Supercapacitor," 2018 IEEE Green Technologies Conference (GreenTech), Austin, TX, 2018, pp. 61-64

23. V. Roy, S. S. Noureen, S. Bayne, A. Bilbao and M. Giesselmann, "A Renewable Solution Approach for Center Pivot Irrigation System," 2018 IEEE Rural Electric Power Conference (REPC), Memphis, TN, 2018, pp. 61-66

24. G. M. Quintero, Y. Reddy Challapuram, A. Bilbao, S. B. Bayne, A. S. Subburaj and M. A. Harral, "Micro-grid System Modeling Efforts using PQ-Control for Single-phase and Three-phase Inverter," 2018 IEEE International Telecommunications Energy Conference (INTELEC), Turin, 2018, pp. 1-5

25. V. Roy, S. S. Noureen, S. B. Bayne, A. Bilbao and M. Giesselmann, "Event Detection From PMU Generated Big Data using R Programming," 2018 IEEE Conference on Technologies for Sustainability (SusTech), Long Beach, CA, USA, 2018, pp. 1-6

26. M. Kim et al., "Analysis of a New 15-kV SiC n-GTO under Pulsed Power Applications," 2019 IEEE Pulsed Power & Plasma Science (PPPS), Orlando, FL, USA, 2019, pp. 1-4

27. A. V. Bilbao and S. B. Bayne, "Compact Rapid Capacitor Charger for Mobile Marx Generator Applications," 2019 IEEE Pulsed Power & Plasma Science (PPPS), Orlando, FL, USA, 2019, pp. 1-4

28. Richard Matovu, Abdul Serwadda, Argenis V. Bilbao, and Isaac Griswold-Steiner. 2020. Defensive Charging: Mitigating Power Side-Channel Attacks on Charging Smartphones. In

Proceedings of the Tenth ACM Conference on Data and Application Security and Privacy (CODASPY '20). Association for Computing Machinery, New York, NY, USA, 179–190

References

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Dr. Stephen B. Bayne Ph. (806) 834-0526
Dr. James A. Schrock Ph. (979) 665-2292
Dr. Mitchell D. Kelley Ph. (806) 595-0151