

Renato Amorim Torres

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Phone: (608)-421-8633

U.S. green card holder

Education

Ph.D. in Electrical Engineering

(Sep 2017 – Jun 2022)

University of Wisconsin-Madison

Minor in Mechanical Engineering

Advisor: Dr. Bulent Sarlioglu

Co-advisor: Dr. Thomas Jahns

Thesis: Design of Wide Bandgap-based Sensorless Current-Source Inverter Integrated Motor Drive

University of Wisconsin-Madison,

(Sep 2017 – May 2020)

M.S. Electrical Engineering

Advisor: Dr. Bulent Sarlioglu

Dissertation: Design of High-Performance DC-link Inductor for Current-Source Inverters

B.S. Electrical Engineering

(Mar 2012 – Nov 2016)

Federal University of Minas Gerais

One-year exchange program

(Sep 2013 – Jul 2014)

University of Wisconsin-Madison, Madison, WI

Professional Experience

Research (Industry and Academia)

Senior Electric Drives Researcher

(Feb 2025 - Present)

General Motors R & D Propulsion System Resch. Lab

Electric Drives Researcher

(Jun 2022 – Jan 2025)

General Motors R & D Propulsion System Resch. Lab

Research Ph.D. Intern in Electric Drives and Power Electronics

(May 2021 – Aug 2021)

General Motors R & D Propulsion System Resch. Lab

Research Assistant

(Sep 2017 – Jun 2022)

WEMPEC – Wisconsin Electric Machines and Power Electronics Consortium

University of Wisconsin-Madison

DOE Funded Project: WBG-Enabled Current-Source Inverters for Integrated PM Motor Drives

Research Assistant (undergraduate)

(Aug 2014 – Dec 2015)

Lab of Control and Conversion of Energy

Federal University of Minas Gerais, Brazil

Research Assistant (undergraduate)

(May 2014 - Jul 2014)

WEMPEC – Wisconsin Electric Machines and Power Electronics Consortium

Researcher/Team Member (undergraduate)

(Jun 2012 - Jun 2013)

BAJA SAE - Federal University of Minas Gerais, Brazil

Engineering (Industry)

Electronics Engineer

Advantage Aeronautical Engineering, Brazil

(Jan 2017 – Apr 2017)

Intern Engineer

Power Utility of the State of Minas Gerais, Brazil

(Feb 2016 - Nov 2016)

Teaching

Professional Development Course - Introduction to Electric Machines and Drives (May & Oct 2025)

University of Wisconsin-Madison

Courses: 1. Application of Wide Bandgap Devices to Power Electronics
2. Introduction to Electric Machines and Drives

Teaching Assistant

University of Wisconsin-Madison

Graduate-level course: Electric machines and drive system laboratory

(Jan 2020 – Jun 2020)

Professional Development Course - Introduction to Electric Machines and Drives

(Mar 2021)

University of Wisconsin-Madison

Courses: Electric Drives Lab Demo

Math Tutor

Brazilian Red Cross Youth Training Program

(Aug 2012)

Awards & Accomplishments

13. 1st Place Lloyd Reuss Collaborative Award from General Motors - Battery AC Heating Project (Nov 2025)

12. Critical Technical Talent Award from General Motors (July 2023)

11. Power engineering award from The College of Engineering – University of Wisconsin-Madison (May 2022)

10. 3rd place - ECCE 2021 Student Demonstration Hardware Competition (High Performance Integrated Motor Drive using WBG-enabled Current-Source Converters)

09. Best student paper - IEEE Transportation Electrification Conference and Expo 2020 (ITEC 2020)

08. One-year exchange program scholarship from the Brazilian government to study in US (CAPES Science without borders 2013)

07. IEEE Power Electronics Society Attendance Student Grant - overseas conference (COBEP/SPEC 2019)

06. Research funding from CNPq - Undergraduate research assistant at Federal University of Minas Gerais (2014 and 2015)

05. 2019 & 2021 WEMPEC Annual Review Technical Presentations

04. Awards with BAJA TEAM in SAE (Society of Automotive Engineers) competitions: 5th place World Challenge 2013; 1st place National (Brazil) 2013; 1st place Regional (Southeast of Brazil) 2012.

03. Bronze Medal at the Brazilian Physics Olympiad in 2009

02. Silver Medal at Brazilian Astronomy and Astronautics Olympiad in 2009

01. Honorable mention at the Brazilian Physics Olympiad in 2008 and 2010.

Journal Publications

(First author = 2)

10. C. -W. Chang, M. Spieler, A. EL-Refaie, R. A. Torres, R. Burgos and D. Dong, "A Distributed-Block Layout Concept for Paralleled Discrete SiC MOSFETs in TO-247 Package," in *IEEE Transactions on Transportation Electrification*, doi: 10.1109/TTE.2025.3650124.
09. W. Lee, J. Im, S. G. Min, **R. A. Torres**, H. Kim and B. Sarlioglu, "Short-Circuit Fault-tolerant Operation of Modular and Reconfigurable Six-phase PMSM Drive," in *IEEE Journal of Emerging and Selected Topics in Power Electronics*, doi: 10.1109/JESTPE.2025.3579297.
08. C. -W. Chang, M. Spieler, A. M. EL-Refaie, **R. A. Torres**, R. Burgos and D. Dong, "A Current-Balancing Gate Driver for Dynamic Current Sharing of Paralleled SiC MOSFETs With Kelvin-Source Connection," in *IEEE Transactions on Power Electronics*, vol. 40, no. 1, pp. 1215-1233, Jan. 2025, doi: 10.1109/TPEL.2024.3475288.
07. **R. A. Torres**, S. Lee, H. Dai, W. Lee, T. M. Jahns and B. Sarlioglu, "Analysis of Pulsating High-Frequency Injection Self-Sensing Control for CSI PM Motor Drives," in *IEEE Transactions on Power Electronics*, doi: 10.1109/TPEL.2024.
06. H. Dai, **R. A. Torres**, F. Chen, T. M. Jahns and B. Sarlioglu, "An H8 Current-Source Inverter Using Single-Gate WBG Bidirectional Switches," in *IEEE Transactions on Transportation Electrification*, vol. 9, no. 1, pp. 1311-1329, March 2023, doi: 10.1109/TTE.2022.3202303.
05. H. Dai, **R. A. Torres**, T. M. Jahns and B. Sarlioglu, "Comparative Study of Conducted Common-Mode EMI in WBG-Enabled DC-Fed Three-Phase Current-Source Inverter," in *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. 10, no. 6, pp. 7188-7204, Dec. 2022, doi: 10.1109/JESTPE.2022.3161422.
04. H. Dai, **R. A. Torres**, J. Gossmann, W. Lee, T. M. Jahns and B. Sarlioglu, "A Seven-Switch Current-Source Inverter Using Wide Bandgap Dual-Gate Bidirectional Switches," in *IEEE Transactions on Industry Applications*, vol. 58, no. 3, pp. 3721-3737, May-June 2022, doi: 10.1109/TIA.2022.3149461.
03. H. Dai, **R. A. Torres**, T. M. Jahns and B. Sarlioglu, "Analysis and Suppression of Conducted Common-Mode EMI in WBG-Based Current-Source Converter Systems," in *IEEE Transactions on Transportation Electrification*, vol. 8, no. 2, pp. 2133-2148, June 2022, doi: 10.1109/TTE.2022.3144426.
02. **R. A. Torres**, H. Dai, W. Lee, B. Sarlioglu and T. Jahns, "Current-Source Inverter Integrated Motor Drives Using Dual-Gate Four-Quadrant Wide-Bandgap Power Switches," in *IEEE Transactions on Industry Applications*, vol. 57, no. 5, pp. 5183-5198, Sept.-Oct. 2021, doi: 10.1109/TIA.2021.3096179.
01. Y. Jiang, **R. A. Torres** and E. L. Severson, "Current Regulation in Parallel Combined Winding Bearingless Motors," in *IEEE Transactions on Industry Applications*, vol. 55, no. 5, pp. 4800-4810, Sept.-Oct. 2019, doi: 10.1109/TIA.2019.2923597.

Peer-reviewed Conference Publications

(First author = 15, * indicates Best Paper Award)

31. I. Osman, **R. A. Torres**, W. Lee, D. Sankaran, Y. Luo, K. Alam, M. Anwar, T. Duhon, "DC-Link Capacitor Design for a Neutral-Point-Less Three-Level Dual-Phase Inverter for Traction Application," in *Proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Philadelphia, PA, USA, 2025.
30. C. -W. Chang, M. Spieler, R. Burgos, A. El-Refaie, **R. A. Torres** and D. Dong, "A Novel Layout for Improving Current Sharing of Paralleled SiC MOSFETs with TO-247 Package," *2025 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Atlanta, GA, USA, 2025, pp. 1495-1500, doi: 10.1109/APEC48143.2025.10977038.
29. C. Chang, M. Spieler, R. Burgos, A. EL-Refaie, **R. A. Torres** and D. Dong, "An Improved di/dt-Based Dynamic Current RC Sensing Method for Paralleled SiC MOSFETs," in *Proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Phoenix, AZ, USA, 2024.
28. **R. A. Torres**, S. Gopalakrishnan, C. Namuduri and Y. Luo, "Novel Low-Loss Filter for Overvoltage Mitigation in WBG-based Hard Switching Electric Drives with AC cables," in *Proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Phoenix, AZ, USA, 2024.
27. P. Peng, L. Hao, **R. A. Torres**, S. Gopalakrishnan and T. Nehl, "Modeling and Analysis of Dual-Three-Phase PMSMs for EV Drive Application," in *Proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Phoenix, AZ, USA, 2024.
26. **R. A. Torres** and B. Sarlioglu, "Accuracy Analysis of Core Loss Measurements for High-Quality Factor Inductors," in *Proc. IEEE 8th Southern Power Electronics Conference and 17th Brazilian Power Electronics Conference (SPEC/COBEP)*, Florianopolis, Brazil, 2023, pp. 1-7.
25. **R. A. Torres**, M. Alvi, C. Namuduri and R. Prasad, "Design and Analysis of High-Voltage Smart Fuse for EV Applications," in *Proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Nashville, TN, USA, 2023, pp. 1752-1758.
24. **R. A. Torres**, H. Dai, T. Jahns, B. Sarlioglu and W. Lee, "Investigation of Pulsating Vector Excitation Saliency-based Rotor Position Estimation Method in Current-Source Inverters," in *Proc. IEEE International Symposium on Sensorless Control for Electrical Drives (SLED)*, Seoul, Korea, Republic of, 2023, pp. 1-8.
23. S. Lee, **R. A. Torres**, F. Chen, T. M. Jahns and B. Sarlioglu, "Thermal Stress Reduction in Power Switching Devices Using Distributed Loss PWM Concept for Current Source Inverters," in *Proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Detroit, MI, USA, 2022, pp. 1-7.
22. **R. A. Torres**, H. Dai, W. Lee, K. Saviers, T. M. Jahns and B. Sarlioglu, "Investigation of Cooling Techniques and Enclosure Types for Integrated Motor Drives," in *Proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Detroit, MI, USA, 2022, pp. 01-08.
21. H. Dai, **R. A. Torres**, T. M. Jahns and B. Sarlioglu, "A Balanced Current-Source Inverter and its dc-Link Shunted Variant for Common-Mode Voltage Cancellation," in *Proc. IEEE 8th Workshop on Wide Bandgap Power Devices and Applications (WiPDA)*, Redondo Beach, CA, USA, 2021, pp. 328-332.
20. W. Lee, **R. A. Torres**, H. Dai, T. M. Jahns and B. Sarlioglu, "Integration and Cooling Strategies for WBG-based Current-Source Inverters-Based Motor Drives," in *Proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Vancouver, BC, Canada, 2021, pp. 5225-5232.

19. **R. A. Torres**, H. Dai, T. M. Jahns, B. Sarlioglu and W. Lee, "Thermal Analysis of Housing-Cooled Integrated Motor Drives," in *Proc. IEEE Transportation Electrification Conference & Expo (ITEC)*, Chicago, IL, USA, 2021, pp. 1-6.
18. F. Chen, S. Lee, **R. A. Torres**, T. M. Jahns and B. Sarlioglu, "Performance Evaluation and Loss Modeling of WBG Devices based on a Novel Double-Pulse Test Method for Current Source Inverter," in *Proc. IEEE Transportation Electrification Conference & Expo (ITEC)*, Chicago, IL, USA, 2021, pp. 219-224.
17. **R. A. Torres**, H. Dai, T. M. Jahns, B. Sarlioglu and W. Lee, "Cooling Design of Integrated Motor Drives Using Analytical Thermal Model, Finite Element Analysis, and Computational Fluid Dynamics," in *Proc. IEEE Applied Power Electronics Conference and Exposition (APEC)*, 2021, pp. 1509-1509.
16. **R. A. Torres**, H. Dai, W. Lee, T. M. Jahns, and B. Sarlioglu, "Evaluation of sensorless techniques for surface permanent-magnet integrated motor drive using current-source inverter," in *Proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, 2020, pp. 2387–2394.
15. H. Dai, **R. A. Torres**, W. Lee, T. M. Jahns, and B. Sarlioglu, "Integrated motor drive using soft-switching current-source inverters with SiC- and GaN-based bidirectional switches," in *Proc. IEEE Energy Conversion Congress and Exposition*, 2020, pp. 2372–2378.
14. H. Dai, **R. A. Torres**, W. Lee, T. M. Jahns and B. Sarlioglu, "Common-mode EMI examination of three-phase voltage-source and current-source converters systems using WBG devices," in *Proc. IEEE Energy Conversion Congress and Exposition*, 2020.
13. H. Dai, **R. A. Torres**, W. Lee, T. M. Jahns and B. Sarlioglu, "High-frequency evaluation of two-level voltage-source and current-source inverters with different output cables," in *Proc. IEEE Energy Conversion Congress and Exposition*, 2020.
12. **R. A. Torres***, H. Dai, W. Lee, T. M. Jahns, and B. Sarlioglu, "A simple and robust controller design for high-frequency WBG-based current-source-inverter-Fed AC motor drive," in *Proc. IEEE Transportation Electrification Conference & Expo*, 2020, pp. 111–117. **(Best Paper Award)**
11. H. Dai, **R. A. Torres**, J. Gossmann, W. Lee, T. M. Jahns, and B. Sarlioglu, "An H7 current-source inverter using wide bandgap bidirectional switches to achieve high efficiency and low conducted common-mode EMI," in *Proc. IEEE Applied Power Electronics Conference and Exposition*, 2020, vol. 2020-March, pp. 2519–2525.
10. **R. A. Torres**, H. Dai, W. Lee, T. M. Jahns, and B. Sarlioglu, "Development of current-source-inverter-based integrated motor drives using wide-bandgap power switches," in *Proc. IEEE 15th Brazilian Power Electronics Conference and 5th IEEE Southern Power Electronics Conference (COBEP/SPEC)*, 2019, pp. 1–6.
09. H. Dai, **R. A. Torres**, T. M. Jahns, and B. Sarlioglu, "An H8 current-source inverter using wide bandgap bidirectional switches," in *Proc. IEEE Energy Conversion Congress and Exposition (ECCE)*, Baltimore, 2019, pp. 2361–2368.
08. **R. A. Torres**, H. Dai, T. M. Jahns, and B. Sarlioglu, "Operation and analysis of current-source inverters using dual-gate four-quadrant wide-bandgap power switches," in *Proc. IEEE Energy Conversion Congress and Exposition*, 2019, pp. 2353–2360.
07. H. Dai, **R. A. Torres**, T. M. Jahns, and B. Sarlioglu, "Characterization and implementation of hybrid reverse-voltage-blocking and bidirectional switches using WBG devices in emerging motor drive applications," in *Proc. IEEE Applied Power Electronics Conference and Exposition*, 2019, pp. 297–304.

06. **R. A. Torres**, H. Dai, T. M. Jahns, and B. Sarlioglu, "Design of high-performance toroidal DC-link inductor for current-source inverters," in *Proc. IEEE Applied Power Electronics Conference and Exposition*, 2019, pp. 2694–2701.
05. **R. A. Torres** and E. L. Severson, "Decoupled control for parallel drive no-voltage bearingless motors," in *Proc. IEEE Energy Conversion Congress and Exposition*, 2018, pp. 1688–1695.
04. H. Dai, T. M. Jahns, **R. A. Torres**, M. Liu, B. Sarlioglu, and S. Chang, "Development of high-frequency WBG power modules with reverse-voltage-blocking capability for an integrated motor drive using a current-source inverter," in *Proc. IEEE Energy Conversion Congress and Exposition*, Portland, 2018, pp. 1808–1815.
03. H. Dai, T. M. Jahns, **R. A. Torres**, D. Han, and B. Sarlioglu, "Comparative evaluation of conducted common-mode EMI in voltage-source and current-source inverters using wide-bandgap switches," in *Proc. IEEE Transportation Electrification Conference and Expo*, Long Beach, 2018, pp. 788–794.
02. **R. A. Torres**, H. Dai, W. Lee, T. M. Jahns, and B. Sarlioglu, "Current-source inverters for integrated motor drives using wide-bandgap power switches," in *Proc. IEEE Transportation Electrification Conference and Expo*, 2018, pp. 1002–1008.
01. **R. A. Torres**, E. F. Cota, and V. F. Mendes, "Ride-through capability improvement of 30kW DFIG-based wind turbine under unsymmetrical voltage dip," in *Proc. IEEE Brazilian Power Electronics Conference*, 2017, vol. 2018-Janua, pp. 1–6.

Patents

Published (First author = 6)

16. Y. Luo, M.-K. Nguyen, **R. A. Torres**, A. Fatemi, T. K. Duhon, A. Narimissa, S. R. Ye, "Two-in-one gear and bearing current sensing and reduction via current choke," U.S. Patent Application 20250256587A1, filed Feb 13, 2024, published Aug 14, 2025.
15. P. Peng, L. Hao, S. Gopalakrishnan, R. A. Torres, D. Li, "Electric drive system with static pulsed power transfer," U.S. Patent Application 20250266778A1, filed Feb. 21, 2024, published Aug. 21, 2025.
14. P. Peng, L. Hao, S. Gopalakrishnan, D. Li, **R. A. Torres**, Y. Luo, T. W. Nehl, " Electric drive system with electric machine having stationary rotor power transfer," U.S. Patent Application 20250183833A1, filed Jun. 6, 2023, published Jun. 5, 2025.
14. P. Peng, T. W. Nehl, D. F. Lahr, A. Fatemi, L. Hao, S. Gopalakrishnan, A. M. Omekanda, **R. A. Torres**, M. Chowdhury, " Synchronous electric machine with reconfigurable rotor and stator poles," U.S. Patent Application 20250125434A1 , filed Oct. 19, 2023, published Apr. 24, 2025.
13. **R. A. Torres**, S. Gopalakrishnan, L. Hao, C. S. Namuduri, V. C. Peddi, "High-frequency alternating current battery heating using voltage commands," U.S. Patent Application 20250125434A1 , filed Oct. 11, 2023, published Apr. 17, 2025.
12. **R. A. Torres**, N. S. Shidore, S. Gopalakrishnan, W. G. Zanardelli, M. Raghavan, S. P. Ketkar, V. C. Peddi, C. S. Namuduri, L. Hao, "Alternating current battery heating in electrical system having multiple electric motors," U.S. Patent Application 20250162460A1, filed Nov. 21, 2023, published May 22, 2025.
11. **R. A. Torres**, S. Gopalakrishnan, C. S. Namuduri, and Y. Luo, "Overvoltage mitigation system," U.S. Patent Application 20250192714A1, filed Dec. 11, 2023, published June 12, 2025.

10. **R. A. Torres**, M. H. Alvi, S. Gopalakrishnan, A. Fatemi, C. J. Lee, and J. Kim, "Motor system control," U.S. Patent Application 20240408974, filed June 9, 2023, published Dec. 12, 2024.
9. **R. A. Torres**, S. Gopalakrishnan, L. Hao, C. S. Namuduri, and T. W. Nehl, "Modulation strategy for maximization of battery heating efficiency," U.S. Patent Application 20240405307, filed June 1, 2023, published Dec. 5, 2024.
8. P. Peng, L. Hao, S. Gopalakrishnan, **R. A. Torres**, and T. W. Nehl, "Electric motor with asymmetric-turn windings and a vehicle having the same," U.S. Patent Application 20240388156, filed May 19, 2023, published Nov. 21, 2024.
7. M. H. Alvi, **R. A. Torres**, C. S. Namuduri, and R. Prasad, "Multilevel direct current (DC) power source powering multilevel inverter," U.S. Patent Application 20240380334, filed May 10, 2023, published Nov. 14, 2024.
6. **R. A. Torres**, L. Hao, S. Gopalakrishnan, C. S. Namuduri, and D. Li, "Alternating current zero torque resistance heating," U.S. Patent Application 20240367552, filed May 3, 2023, published Nov. 7, 2024.
5. M. H. Alvi, C. S. Namuduri, R. Prasad, and **R. A. Torres**, "Detection system for detecting capacitance degradation in inverters," U.S. Patent 11,860,196, filed Dec. 1, 2021, granted Jan. 2, 2024.
4. M. H. Alvi, C. S. Namuduri, and **R. A. Torres**, "High voltage powered solid state fuse with battery power control," U.S. Patent 11,850,950, filed Jan. 19, 2022, granted Dec. 26, 2023.
3. T. M. Jahns, H. Dai, B. Sarlioglu, and **R. A. Torres**, "Balanced current-source inverter," U.S. Patent 11,575,329, filed Sept. 1, 2021, granted Feb. 7, 2023.
2. T. M. Jahns, H. Dai, B. Sarlioglu, **R. A. Torres**, and W. Lee, "Current source inverter using bidirectional switches with bidirectional power flow capability," U.S. Patent Application 20220294365, filed Mar. 11, 2022, published Sept. 15, 2022.
1. H. Dai, T. M. Jahns, B. Sarlioglu, and **R. A. Torres**, "Current source inverter with bi-directional switches," U.S. Patent 11,387,746, filed Mar. 15, 2019, granted July 12, 2022.

* Filed but unpublished patents: 24 (First author =8)

Other Publications

01. **R. A. Torres**, Y. H. Hu, "Prediction of NBA games based on Machine Learning Methods," University of Wisconsin, Madison, 2013

(Co) Mentoring

Ashi Amin (Summer Intern at General Motors - Power Electronics & Energy Conversion Sys.) (2022)
Project: "3-phase Inverter Drive EMI Modeling & Measurement"

Mason Crooks (Undergraduate Summer Research Assistant) (2021)
Development of technical skills: PCB Design/Soldering, 3D Cad Desing & 3D printing

Jerome Gossmann (visitor student at UW-Madison) (2019)
M. S. Research Thesis: "Three-Phase Current-Source Rectifier for AC-AC Converters"

Ad-Hoc Reviewer

IEEE Transactions on Power Electronics (15 Articles)
IEEE Transactions on Transportation Electrification (2 Articles)
IEEE Transactions on Industry Applications (4 Articles)

IEEE Open Journal of Power Electronics (1 Article)
IEEE Energy Conversion Congress & Expo 2023 (9 Papers)
IEEE Energy Conversion Congress & Expo 2024 (8 Papers)
SAE World Congress Experience 2023 (2 Papers)
SAE World Congress Experience 2024 (1 Paper)
Revista Eletrônica de Potência – Open Journals of Power Electronics (1 paper)

Membership

IEEE Member (6 years)
IEEE Industry Applications Society Membership (6 years)
IEEE Power Electronics Society Membership (6 years)
IEEE Young Professionals (4 years)
IEEE Electromagnetic Compatibility Society Membership (1 year)
Chair of IEEE student branch IAS chapter at UW-Madison (1 year)

Skills/Proficiencies

Simulation software tools: PLECS, MATLAB, MATLAB Simulink, LTSpice, PSIM

Design: Altium Designer (for PCB), Solid Works

Programming language: C, C++, Matlab, Python

FEA: Ansys Q3D extractor, Ansys SI Wave, Ansys Workbench, Ansys Electronic Desktop, Ansys Maxwell, JMAG, FEMM

Controllers: dSpace, TI C2000, Etas INCA, PIC

Equipment: Power analyzer, spectrum analyzer, frequency response analyzer, impedance analyzer, vector network analyzer, oscilloscopes, curve tracer, hipot tester, data acquisition systems, controller systems, electronics loads, power supplies.

Academic References

Dr. Bulent Sarlioglu
University of Wisconsin-Madison
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Dr. Thomas Jahns
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Dr. Woongkul Matt Lee
Purdue University
lee5279@purdue.edu