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EDUCATION

Institution	Degree	Year	Field of Study
University of Colorado at Boulder Dissertation title , “ <i>Development, analysis, and implementation of an ASIC controller for single-phase power factor correction.</i> ”	Ph.D.	1999	Electrical Engineering
University of Colorado at Boulder	M.S. (GPA: 4.0)	1998	Electrical Engineering
University of Colorado at Boulder	B.S. (GPA: 4.0)	1996	Electrical Engineering

RESEARCH INTERESTS

- Modeling, analysis and design of high frequency switched mode power supplies (SMPS) in power ranges from micro-watts to kilowatts; dc-dc, ac-dc and resonant topologies
- SMPS system feedback and stability analysis, controller design, digital control techniques
- Custom analog and mixed signal integrated circuit design for SMPS
- Power management in energy efficient lighting systems: solid-state and electric discharge lamps
- Low power energy harvesting for wireless sensors in commercial, aerospace and medical applications
- Robust and adaptive control of power converter cells and modular systems
- Power management, electronics design and energy efficiency in renewable energy systems

EMPLOYMENT

2008 – present	Associate Professor , <i>Department of Electrical and Computer Engineering</i> , University of Colorado at Boulder
2001 – 2008	Assistant Professor , <i>Department of Electrical and Computer Engineering</i> , University of Colorado at Boulder
1999 – 2001	Senior Research Scientist , <i>Electronic Power Conversion</i> , Corporate Research & Development Center, General Electric, Niskayuna, NY. Principle researcher in area of custom integrated circuits for power management applications within GE businesses with an emphasis on miniature controllers for energy efficient lighting systems.
1999	Graduate Part Time Instructor (GPTI) , <i>Department of Electrical and Computer Engineering</i> , University of Colorado at Boulder

HONORS AND AWARDS

2008	IEEE Power Electronics Society Richard M. Bass Outstanding Young Power Electronics Engineer Award
2008	Coleman Institute Faculty Sabbatical Fellowship
2008	John and Mercedes Peebles Innovation in Teaching Award, University of Colorado
2007	IEEE Power Electronics Society Transaction Prize Letter Award
2007	Senior Member, IEEE
2006	Provost Faculty Achievement Award, University of Colorado
2006	Inventor of the Year Award, Technology Transfer Office, University of Colorado

- 2006 IEEE MTT Microwave Prize for best journal paper
- 2004 NSF Faculty Early Career Development (CAREER) Program Award Recipient
- 2001 Six-Sigma Green Belt Certificate, GE Corporate Research and Development.
- 2001 Manager's Award, General Electric Corporate Research and Development.
- 1993 – 1998 Member Dean's list, University of Colorado.
- 1995 – 1996 Marcellus and Geraldine Merrill Scholarship, University of Colorado.
- 1992 National DECA competition, 2nd place in marketing and business.

PUBLICATION RECORD

Journals (published or in press)

See <http://ece.colorado.edu/~zane>

- [1] J. Morroni, **R. Zane**, D. Maksimovic, "Design and implementation of an adaptive tuning system based on desired phase margin for digitally controlled DC-DC converters," *IEEE Trans. Power Electron.*, vol. 24, no. 2, pp. 559 – 564, Feb. 2009.
- [2] M. Shirazi, J. Morroni, A. Dolgov, **R. Zane**, D. Maksimovic, "Integration of frequency response measurement capabilities in digital controllers for DC-DC converters," *IEEE Trans. Power Electron.*, vol. 23, no. 5, pp. 2524 – 2535, Sep. 2008.
- [3] F. Javier Diaz, F. J. Azcondo, Ch. Branas, R. Casanueva, **R. Zane**, "Digital control of a low-frequency square-wave electronic ballast with resonant ignition," *IEEE Trans. Ind. Electron.*, vol. 55, no. 9, pp. 3180 – 3191, Sep. 2008.
- [4] Y. Yin and **R. Zane**, "Dual low-voltage IC design for high-voltage floating gate drives," *IEEE Trans. Circuits Syst. I, Reg. Papers*, vol. 55, no. 6, pp. 1751 – 1758, Sep. 2008.
- [5] T. Carosa, **R. Zane**, D. Maksimović, "Scalable digital multiphase modulator," *IEEE Trans. Power Electron., Lett.*, vol. 23, no. 4, pp. 2201-2205, Jul. 2008.
- [6] T. Paing, J. Shin, **R. Zane**, Z. Popovic, "Resistor emulation approach to low-power RF energy harvesting," *IEEE Trans. Power Electron.*, vol. 23, no. 3, pp. 1494 – 1501, May 2008.
- [7] Y. Yin, M. Shirazi, **R. Zane**, "Electronic ballast control IC with digital phase control and lamp current regulation," *IEEE Trans. Power Electron.*, vol. 23, no. 1, pp. 11 – 18, Jan. 2008.
- [8] D. Maksimović, **R. Zane**, "Small-signal discrete-time modeling of digitally controlled DC-DC converters," *IEEE Trans. Power Electron., Lett.*, vol. 22, no. 6, pp. 2552 – 2556, Nov. 2007.
Received the 2007 IEEE Power Electronics Society Transaction Prize Letter Award.
- [9] X. Zhao, T. Qian, G. Mei, C. Kwan, C. Walsh, T. Paing, **R. Zane**, Z. Popovic, "Active health monitoring of an aircraft wing with an embedded piezoelectric sensor/actuator network: II. Wireless approaches," *Smart Mater. Struct.* 16 (2007) 1218 – 1225.
- [10] F.J. Azcondo, **R. Zane**, Ch. Brañas, "Design of resonant inverters for optimal efficiency over lamp life in electronic ballast with phase control," *IEEE Trans. Power Electron., special issue on lighting*, vol. 22, no. 3, pp. 815 – 823, May 2007.
- [11] S. Johnson, **R. Zane**, "Custom spectral shaping for EMI reduction in high frequency inverters and ballasts," *IEEE Trans. Power Electron.*, vol. 20, no. 6, pp. 1499 – 1505, Nov. 2005.
- [12] B. Miao, **R. Zane**, D. Maksimović, "System identification of power converters with digital control through cross-correlation methods," *IEEE Trans. Power Electron.*, vol. 20, no. 5, pp. 1093 – 1099, Sep. 2005.
- [13] Y. Zhang, **R. Zane**, R. Erickson, D. Maksimović, A. Prodic "On-line calibration of MOSFET switch on-state resistance for precise current sensing," *IEEE Trans. Power Electron., Lett.*, vol. 2, no. 3, pp. 100 – 103, Sep. 2004.

- [14] Y. Yin, **R. Zane**, R. Erickson, J. Glaser, “Direct modeling of envelope dynamics in resonant inverters,” *IEE Electron. Lett.*, vol. 40, no. 13, pp. 834 – 836, Jun. 2004.
- [15] Y. Yin, **R. Zane**, “Digital phase control for resonant inverters,” *IEEE Trans. Power Electron., Lett.*, vol. 2, no. 2, pp. 51 – 53, June 2004.
- [16] J. Hagerty, F. Helmbrecht, W. McCalpin, **R. Zane**, Z. Popovic, “Recycling ambient microwave energy with broadband rectenna arrays,” *IEEE Trans. Microw. Theory Tech.*, vol. 52, no. 3, pp. 1014 – 1024, Mar. 2004.
Received the 2006 IEEE MTT Microwave Prize for best journal paper.
- [17] Y. Yin, **R. Zane**, J. Glaser, R. Erickson, “Small-signal analysis of frequency-controlled electronic ballasts,” *IEEE Trans. Circuits Syst. I: Fundam. Theory and Appl.*, vol. 50, No. 8, pp. 1103 – 1110, Aug. 2003.
- [18] **R. Zane**, D. Maksimović, “Nonlinear-carrier control for high-power-factor rectifiers based on up-down switching converters,” *IEEE Trans. Power Electron.*, vol. 13, no. 2, pp. 213 – 221, Mar. 1998.

Manuscripts Submitted to Journals (in first or second review)

- [1] M. Doshi, **R. Zane**, F. Azcondo, “Low frequency architecture for multi-lamp CCFL systems with capacitive ignition,” in press, *IEEE J. Displ. Technol.*, Jun. 2008.
- [2] M. Doshi, **R. Zane**, “Dimming Control of LED Light Sources using Uniform Phase-Shift Pulse Width Modulation,” in review, *IEEE Trans. Power Electron.*, Aug. 2008.
- [3] J. Morroni, **R. Zane**, D. Maksimovic, “Design and Implementation of an Online Stability Margin Monitor for Digitally Controlled Switched-Mode Power Supplies,” to be submitted, *IEEE Trans. Power Electron.*, Feb 2009.
- [4] A. Dolgov, **R. Zane**, Z. Popovic, “Adaptive MPPT Power Management System for Low Power RF Energy Harvesting,” to be submitted, *IEEE Trans. Circuits Syst.*, Feb 2009.

Full Conference Papers with Peer Review (published or in press)

See <http://ece.colorado.edu/~zane>

- [1] Q. Hu, **R. Zane**, “LED drive circuit with series input connected converter cells operating in continuous conduction mode,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Washington, DC, Feb. 2009, pp. 1511 – 1517.
- [2] J. Morroni, **R. Zane**, D. Maksimovic, “Robust adaptive tuning of digitally controlled switched-mode power supplies,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Washington, DC, Feb. 2009, pp. 240 – 246.
- [3] T. Paing, E. Falkenstein, **R. Zane**, Z. Popovic, “Custom IC for ultra-low power RF energy harvesting,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Washington, DC, Feb. 2009, pp. 1239 – 1245.
- [4] R. Schnell, J. Diaz, Ch. Branas, F. Azcondo, **R. Zane**, “Digital phase control of an integrated resonant ignitor using a soft saturation core for high intensity discharge lamps,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Washington, DC, Feb. 2009, pp. 1526 – 1531.
- [5] J. Patterson, **R. Zane**, “Series input modular architecture for driving multiple LEDs,” in *Proc. IEEE Power Electron. Specialists Conf*, Athens, Greece, June 2008, pp. 2650 – 2656.
- [6] J. Morroni, **R. Zane**, D. Maksimovic, “An online phase margin monitor for digitally controlled switched-mode power supplies,” in *Proc. IEEE Power Electron. Specialists Conf*, Athens, Greece, June 2008, pp. 859 – 865.
- [7] J. Morroni, **R. Zane**, D. Maksimovic, “Adaptive tuning of digitally controlled switched mode power supplies based on desired phase margin,” in *Proc. IEEE Power Electron. Specialists Conf*, Athens, Greece, June 2008, pp. 1250 – 1256.
- [8] M. Doshi, **R. Zane**, “Reconfigurable and fault tolerant phase shifted modulator for luminance control of LED light sources,” in *Proc. IEEE Power Electron. Specialists Conf*, Athens, Greece, June 2008, pp. 4185 – 4191.
- [9] T. Paing, J. Morroni, A. Dolgov, J. Shin, J. Brannan, **R. Zane**, Z. Popovic, “Wirelessly-powered wireless sensor platform,” in *Proc. IEEE European Microw. Conf.*, Munich, Germany, Oct. 2007, pp. 999 – 1002.

- [10] F. Javier Diaz, F. J. Azcondo, **R. Zane**, “Digitally controlled low frequency square wave electronic ballast with resonant ignition and power loop,” in *Proc. IEEE Ind. Appl. Soc. Ann. Meeting*, New Orleans, LA, Sept. 2007, pp. 826 – 832.
- [11] F. Javier Diaz, F. J. Azcondo, Ch. Branas, R. Casanueva, **R. Zane**, “Control of low frequency square-wave electronic ballast with resonant ignition using a dsPIC30F2010,” in *Proc. IEEE Int. Symp. Ind. Electron.*, Vigo, Spain, Jun., 2007, pp. 3019 – 3024.
- [12] J. Morroni, A. Dolgov, **R. Zane**, D. Maksimović, “Online health monitoring in digitally controlled power converters,” in *Proc. IEEE Power Electron. Specialists Conf.*, Orlando, FL, Jun. 2007, pp. 112 – 118.
- [13] M. Shirazi, L. Corradini, **R. Zane**, P. Mattavelli, D. Maksimović, “Autotuning techniques for digitally controlled point-of-load converters with wide range of capacitive loads,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Anaheim, CA, Feb. 2007, pp. 14 – 20.
- [14] M. Doshi, **R. Zane**, “Digital Architecture for Driving Large LED Arrays with Dynamic Bus Voltage Regulation and Phase Shifted PWM,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Anaheim, CA, Feb. 2007, pp. 287 – 293.
- [15] A. Dolgov, **R. Zane**, “Low-power wireless medical sensor platform,” in *Proc. IEEE Eng. in Medicine and Biology Soc. Ann. Conf.*, New York City, NY, Aug. 2006, pp. 2067 – 2070.
- [16] Y. Zhang, **R. Zane**, D. Maksimović, “Dynamic loop analysis for modular masterless multi-phase dc-dc converters,” in *Proc. IEEE Workshop Comput. Power Electron. (COMPEL)*, Troy, NY, Jul. 2006, pp. 22 – 28.
- [17] X. Zhang, Y. Zhang, **R. Zane**, D. Maksimović, “Design and implementation of a wide-bandwidth digitally controlled 16-phase converter,” in *Proc. IEEE Workshop Comput. Power Electron. (COMPEL)*, Troy, NY, Jul. 2006, pp. 106 – 111.
- [18] T. Carosa, **R. Zane**, D. Maksimović, “Implementation of a 16 phase digital modulator in a 0.35um process,” in *Proc. IEEE Workshop Comput. Power Electron. (COMPEL)*, Troy, NY, Jul. 2006, pp. 159-165.
- [19] D. Maksimović, **R. Zane**, “Small-signal discrete-time modeling of digitally controlled DC-DC converters,” in *Proc. IEEE Workshop Comput. Power Electron. (COMPEL)*, Troy, NY, Jul. 2006, pp. 231 – 235.
- [20] B. Miao, **R. Zane**, D. Maksimović, “FPGA-based digital network analyzer for digitally controlled SMPS,” in *Proc. IEEE Workshop Comput. Power Electron. (COMPEL)*, Troy, NY, Jul. 2006, pp. 240 – 245.
- [21] A. Dolgov, B. Miao, **R. Zane**, D. Maksimović, “GUI-based laboratory architecture for teaching and research in digital control of SMPS,” in *Proc. IEEE Workshop Comput. Power Electron. (COMPEL)*, Troy, NY, Jul. 2006, pp. 236 – 239.
- [22] T. Carosa, **R. Zane**, D. Maksimović, “Digital multiphase modulator – A power D/A perspective,” in *Proc. IEEE Power Electron. Specialists Conf.*, Jeju, Korea, Jun. 2006, pp. 1 – 6.
- [23] T. Paing, **R. Zane**, “Resistor emulation approach to low-power energy harvesting,” in *Proc. IEEE Power Electron. Specialists Conf.*, Jeju, Korea, Jun. 2006, pp. 1 – 7.
- [24] M. Weimer, T. Paing, **R. Zane**, “Remote area wind energy harvesting for low-power autonomous sensors,” in *Proc. IEEE Power Electron. Specialists Conf.*, Jeju, Korea, Jun. 2006, pp. 1 – 5.
- [25] Y. Zhang, **R. Zane**, D. Maksimović, “System modeling and digital control in modular masterless multiphase dc-dc converters,” in *Proc. IEEE Power Electron. Specialists Conf.*, Jeju, Korea, Jun. 2006, pp. 1 – 7.
- [26] Y. Zhang, X. Zhang, **R. Zane**, D. Maksimović, “Wide-bandwidth control for multi-phase converters,” in *Proc. IEEE Power Electron. Specialists Conf.*, Jeju, Korea, Jun. 2006, pp. 1 – 7.
- [27] M. Doshi, **R. Zane**, F. Azcondo, “Low-frequency square-wave drive for large screen LCD-TV backlighting systems,” in *Proc. Soc. Inform. Display (SID) Int. Symp. Expo.*, Jun. 2006, San Francisco, CA, pp. 1238 – 1241.
- [28] F. Azcondo, F. J. Diaz, R. Casanueva, C. Branas, **R. Zane**, “Low-frequency square-wave electronic ballast with resonant ignition using digital mode and power control,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Dallas, TX, Mar. 2006, pp. 1044 – 1050.
- [29] B. Miao, **R. Zane**, D. Maksimović, “Automated digital controller design for switching converters,” in *Proc. IEEE Power Electron. Specialists Conf.*, Recife, Brazil, Jun. 2005, pp. 2729 – 2735.

- [30] Y. Zhang, **R. Zane**, D. Maksimović, “Current sharing in digitally controlled masterless multiphase DC-DC converters,” in *Proc. IEEE Power Electron. Specialists Conf.*, Recife, Brazil, Jun. 2005, pp. 2722 – 2728.
- [31] **R. Zane**, Z. Popovic, “Efficient broadband RF energy harvesting for wireless sensors,” in *Proc. Govern. Microcircuit Appl. Critical Tech. Conf. (GOMACTech)*, Las Vegas, NV, Apr. 2005, pp. 1 – 4.
- [32] M. Doshi, J. Bian, **R. Zane**, F.J. Azcondo, “Low Frequency Architecture for Multi-Lamp CCFL Systems with Capacitive Ignition,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Austin, TX, Mar. 2005, vol. 2, pp. 1072 – 1078.
- [33] Y. Yin, **R. Zane**, “Integrated Results for Dual Low Voltage IC Based High and Low Side Gate Drive,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Austin, TX, Mar. 2005, vol. 2, pp. 759 – 765.
- [34] Y. Yin, M. Shirazi, **R. Zane**, “Fully Integrated Ballast Controller with Digital Phase Control,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Austin, TX, Mar. 2005, vol. 2, pp. 1065 – 1071.
- [35] B. Miao, **R. Zane**, D. Maksimović, “Practical On-Line Identification of Power Converter Dynamic Responses,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Austin, TX, Mar. 2005, vol. 2, pp. 57 – 62.
- [36] B. Miao, **R. Zane**, D. Maksimović, “Detection of Instability and Adaptive Compensation of Digitally Controlled Switched Mode Power Supplies,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Austin, TX, Mar. 2005, vol. 2, pp. 63 – 69.
- [37] F.J. Azcondo, **R. Zane**, Ch. Brañas, “Design of Resonant Inverters for Optimal Efficiency over Lamp Life in Electronic Ballast with Phase Control,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Austin, TX, Mar. 2005, vol. 2, pp. 1053 – 1059.
- [38] **R. Zane**, B. Miao, D. Maksimović, “Active System Identification of a DC-DC Converter Using Digital Control,” in *Proc. Amer. Inst. Aeronaut. Astronaut. (AIAA) 2nd Int. Energy Convers. Eng. Conf. (IECEC)*, Providence, RI, Aug. 2004, pp. AIAA 2004 – 5731.
- [39] Y. Yin, **R. Zane**, “Digital Controller Design for Electronic Ballasts with Phase Control,” in *Proc. IEEE Power Electron. Specialists Conf.*, Aachen, Germany, Jun. 2004, pp. 1855 – 1860.
- [40] B. Miao, **R. Zane**, D. Maksimović, “A modified cross-correlation method for system identification of power converters with digital control,” in *Proc. IEEE Power Electron. Specialists Conf.*, Aachen, Germany, Jun. 2004, pp. 3728 – 3733.
- [41] D. Maksimović, **R. Zane**, R. Erickson, “Impact of digital control in power electronics,” in *Proc. IEEE Int. Symp. Power Semicond. Dev. ICs*, Kitakyushu, Japan, May 2004, pp. 13 – 22.
- [42] S. Johnson, Y. Yin, **R. Zane**, “Custom spectral shaping for EMI reduction in electronic ballasts,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Anaheim, CA, Feb. 2004, pp. 137 – 142.
- [43] Y. Yin, **R. Zane**, “Dual low voltage IC based high and low side gate drive,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Anaheim, CA, Feb. 2004, pp. 1033 – 1038.
- [44] Y. Zhang, A. Prodic, **R. Zane**, D. Maksimović, “On-line calibration of lossless current sensing,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, Anaheim, CA, Feb. 2004, pp. 1345 – 1350.
- [45] Y. Yin, **R. Zane**, J. Glaser, R. Erickson, “Direct modeling of envelope dynamics in resonant inverters,” in *Proc. IEEE Power Electron. Specialists Conf.*, Acapulco, Mexico, Jun. 2003, pp. 1313 – 1318.
- [46] Y. Yin, **R. Zane**, J. Glaser, R. Erickson, “Dynamic analysis of frequency-controlled electronic ballasts,” in *Proc. IEEE Ind. Appl. Soc. Ann. Meeting*, Pittsburgh, PA, Oct. 2002, vol. 1, pp. 685 – 691.
- [47] **R. Zane**, D. Maksimović, “A mixed-signal ASIC power-factor-correction (PFC) controller for high frequency switching rectifiers,” in *Proc. IEEE Power Electron. Specialists Conf.*, Charleston, SC, Jun. 1999, pp. 117 – 122.
- [48] **R. Zane**, D. Maksimović, “Frequency scalable non-linear waveform generator for mixed-signal power-factor-correction IC controller,” in *Proc. IEEE Custom Integrated Circuits Conf.*, San Diego, CA, May 1999, pp. 609 – 612.
- [49] **R. Zane**, D. Maksimović, “Modeling of high-power-factor rectifiers based on switching converters with nonlinear-carrier control,” in *Proc. IEEE Power Electron. Specialists Conf.*, Baveno, Italy, Jun. 1996, pp. 1105 – 1111.

- [50] **R. Zane**, D. Maksimović, “Nonlinear-carrier control for high-power-factor rectifiers based on flyback, Cuk or SEPIC converters,” in *Proc. IEEE Appl. Power Electron. Conf. Expo.*, San Jose, CA, Mar. 1996, pp. 814 – 820.

Full Conference Papers with Peer Review (in review)

See <http://ece.colorado.edu/~zane>

- [1] L. Corradini, **R. Zane**, D. Maksimović, “Fully Digital Hysteretic Modulator for DC-DC Switching Converters,” in review *IEEE Energy Conversion Congress and Exposition*, San Jose, CA, Sep. 2009.

Patents, Issued

- [1] **R. Zane**, D. Maksimović, Y. Zhang, “Active current sharing multiphase DC-DC converter,” US Patent #7,479,772, Jan. 2009.
- [2] L. Stevanovic, **R. Zane**, “System and method for regulating resonant inverters,” US patent #7,262,981, Aug. 2007.
- [3] J. Glaser, **R. Zane**, “Dimmable self-oscillating electronic ballast for fluorescent lamp,” US patent #6,815,908, Nov. 2004.
- [4] J. Glaser, **R. Zane**, “Non-synchronous control of self-oscillating resonant converters,” US Patent #6,407,514, Jun. 2002.

Patents, Filed, Pending

- [1] C. Hunt, **R. Zane**, R. Herring, “System and method for cathodoluminescent lighting,” US patent application filed Jan. 2008.
- [2] T. Carosa, **R. Zane**, D. Maksimović, “Digital multiphase modulator,” US patent filed Feb. 2007.
- [3] **R. Zane**, M. Doshi, “Systems and methods for driving multiple solid-state light sources,” US patent application 11678517, filed Feb. 2007.
- [4] **R. Zane**, “Capacitive coupling to aid ignition in discharge lamps,” US patent application 20060244393, filed Mar. 2006.
- [5] **R. Zane**, “A method for operating parallel discharge lamps with a low frequency drive,” US provisional filed, Mar. 2006.
- [6] **R. Zane**, Z. Popovic, “A method for delivering, receiving and managing power in wireless devices,” patent disclosure submitted, Nov. 2004, provisional patents filed Jul. 2005 and Jan. 2006; PCT filed 2007, US patent filed 2008.

Invited Presentations and Seminars

- [1] **R. Zane**, “Low Power Energy Harvesting -- Making the Difference with Efficient Power Management,” invited presentation, Future of DC-DC Conversion, IEEE Applied Power Electronics Specialists Conference (APEC), Washington D.C., Feb. 2009.
- [2] **R. Zane**, “Towards externally powered telemetric chronic neural implants,” invited seminar as part of the NSF international collaboration travel grant, Towards a Dynamic Brain Clamp, Federal University of Ceara, Sobral, Brazil, Jan 2009.
- [3] **R. Zane**, “Low power energy harvesting for wireless sensors,” Grainger invited seminar series, University of Illinois, Champaign-Urbana, Dec. 2008.
- [4] **R. Zane**, “Digital control in SMPS,” invited industry short course, On-semiconductor, Toulouse, France, May 2008.
- [5] Z. Popovic, **R. Zane**, “RF energy harvesting,” invited presentation, *Darnell nanoPower Forum*, San Jose, CA, Jun. 2008.
- [6] **R. Zane**, “Digital auto-tuning and adaptive techniques for SMPS,” invited seminar, IEEE PELS-IES joint technical session, Santander, Spain, Apr. 2008.

- [7] J. Shin, **R. Zane**, Z. Popovic, “Batteryless microPower sensors for context aware technologies,” invited presentation, RESNA 2007, sponsored by NSF Emerging Technology – Tools for the Future, Phoenix, AZ, Jun. 2007.
- [8] **R. Zane**, Z. Popovic, “Efficient low power RF energy harvesting and power management,” invited presentation, *Darnell nanoPower Forum*, San Jose, CA, Jun. 2007.
- [9] **R. Zane**, “CAREER: Modeling, control and design of energy-efficient lighting systems,” invited presentation, NSF 2004 Grantees workshop, Reno, NV, Apr. 2007.
- [10] **R. Zane**, D. Maksimović, “Digital control of switch-mode power supplies,” on-site invited industry short course, Analog Devices Inc., San Jose, CA, Jul. 2006.
- [11] **R. Zane**, D. Maksimović, “Digital control of switched-mode power supplies,” professional educational seminar, *IEEE Applied Power Electronics Conference and Exposition*, Dallas, TX, Mar. 2006.
- [12] **R. Zane**, Z. Popovic, “Harvesting ambient energy for low power sensors,” invited presentation, *IEEE Presents Innovation and Technology in Colorado*, Colorado Technology Week, Denver, CO, Oct. 2005.
- [13] **R. Zane**, Z. Popovic, “Batteryless MicroPower Sensors for Context Aware Technologies,” invited presentation, *Annual Coleman Institute Meeting*, Oct. 2005.
- [14] **R. Zane**, D. Maksimović, B. Miao, “Active identification and automated digital controller design in DC-DC power converters,” invited presentation, *Annual AFRL Space Power Workshop*, Apr. 2005.
- [15] T. Zhao, J. Israel, **R. Zane**, Z. Popovic, “Electronics for wireless neural sensors,” poster presentation, *Coleman Institute Annual Conference*, Oct. 2004.
- [16] **R. Zane**, “Digital control in switch mode power supplies,” on-site invited industry tutorial, Artesyn Technologies, Framingham, MA, May 2004.
- [17] D. Maksimović, A. Prodic, **R. Zane**, “Digital control of high-frequency switching power converters,” professional educational seminar, *IEEE Applied Power Electronics Conference and Exposition*, Anaheim, CA, Feb. 2004.
- [18] D. Restrepo, D. Finch, **R. Zane**, A. Sharp, “CEMS-based chronic brain implants,” poster presentation, *Coleman Institute Annual Conference*, Oct. 2003.
- [19] **R. Zane**, D. Maksimović, “Custom IC blocks for enabling digital control in switching power converters,” invited lecture series, *IEEE Solid-State Circuits Society*, Denver chapter, Jul. 2003.
- [20] **R. Zane**, D. Maksimović, “Digital control in switching converters,” *Annual AFRL Space Power Workshop*, Apr. 2003.
- [21] D. Restrepo, D. Finch, **R. Zane**, M. Stowell, A. Sharp, “CEMS-based chronic brain implants,” poster presentation, *Coleman Institute Annual Conference*, October 2002.
- [22] D. Maksimović, **R. Zane**, “Scalable digital control for switching power converters,” invited presentation, *Intel Technology Symposium*, Seattle, Aug. 2002.
- [23] **R. Zane**, D. Maksimović “Intelligent control in power converters and systems” *DARPA workshop on integrated smart power*, Arlington, VA, Nov. 2002.

RESEARCH GRANTS & CONTRACTS

Research Grants and Contracts Awarded

- On-Semiconductor, “Digitally controlled Class-D audio amplifiers for portable applications,” Total: \$44k
Role: PI, Colorado Power Electronics Center (CoPEC), Jan 2009 – Dec 2009.
Investigators: **R. Zane** (PI, ECE, UCB), L. Corradini (ECE, UCB), R. Erickson (ECE, UCB).
- NSF, “Towards a Dynamic Brain Clamp,” International collaboration travel grant, Total: \$30K.
Role: Co-PI; travel grant lead by PI D. Restrepo, UCHSC, UC-Denver; Travel to Federal University of Ceara, Sobral, Brazil, Jan 2009.

- Coleman Institute, “Low-power energy harvesting in cognitive disability applications,” Total: \$77K
Sabbatical Faculty Fellowship, Fall 2008 – Spring 2009.
Investigators: **R. Zane** (Co-PI, ECE, UCB), Z. Popovic (Co-PI, ECE, UCB).
- MSI/DARPA, “PPeC: Parasitically Powered embedded Communication,” Total: \$88K
Role: Co-PI, subcontract to MicroSat Systems (MSI), Jan 2008 – Dec. 2008.
Investigators: **R. Zane** (Co-PI, ECE, UCB), Z. Popovic (Co-PI, ECE, UCB).
- NASA, “Wireless Ultrasonic Transducer Network for Airframe Structure Health Management,” Total:
\$100K, subcontract to Intelligent Automation, Inc.
Role, PI, Jan. 2008 – Dec. 2010.
Investigators: **R. Zane** (ECE, UCB).
- NSF, “IREE: Modeling, control and design of energy efficient lighting systems,” Total: \$44.5K
Role: PI, International Research and Education in Engineering (IREE) supplement on NSF CAREER
grant. Sep. 2007 – Jun. 2008.
Investigators: **R. Zane** (PI, ECE, UCB).
- NSF CNS, “NOSS: An integrated power aware sensor-simulation network system for long-term
performance assessment of concrete infrastructures,” Total: \$600K:
Role, Co-PI, Sep. 2007 – Aug. 2010.
Investigators: X.C. Cai (PI, CS, UCB), **R. Zane** (ECE, UCB), Y. Xi (Civil, UCB).
- DOE, “Miasolé Solar America Initiative, SAI,” Total: \$1,049,874 (Awarded by DOE, but later withdrawn by Miasole)
Role: Co-PI, DOE SAI, subcontract to Miasolé, Aug. 2007 – Jul. 2010.
Investigators: M. Brandemuehl (PI, CEAE, UCB), R.W. Erickson (ECE, UCB), **R. Zane** (ECE,
UCB).
- On-Semiconductor, “LED drives for general lighting applications,” Total award: \$88K:
Role: PI, Colorado Power Electronics Center (CoPEC), Jan. 2007 – Dec. 2008.
Investigators: **R. Zane** (PI, ECE, UCB).
- National Semiconductor, “System IC controls for backlighting in LCD HDTV,” Total: \$326K:
Role: PI, Colorado Power Electronics Center (CoPEC), Aug. 2003 – July. 2009.
Investigators: **R. Zane** (PI, ECE, UCB).
- Powercast Corp., “Integrated design of rectenna and power management circuit,” Total: \$44K:
Role: PI, Colorado Power Electronics Center (CoPEC), Aug. 2007 – July. 2008.
Investigators: **R. Zane** (PI, ECE, UCB), Z. Popovic (ECE, UCB).
- Analog Devices, Inc., “Digital control loops in SMPS,” Total award: \$176K:
Role: PI, Colorado Power Electronics Center (CoPEC), Oct. 2006 – Sept. 2009.
Investigators: **R. Zane** (PI, ECE, UCB).
- NASA Glenn, “Spacecraft Power Converter Health Monitoring and Prognostics,” Total: \$137K:
Role: PI, program period: Apr. 2006 – Mar. 2009.
Investigators: **R. Zane** (PI, ECE, UCB), D. Maksimović (ECE, UCB).
- Astec / Artesyn Technologies, “Auto-tuning controller for POL converters” Total: \$88K
Role: PI, Colorado Power Electronics Center (CoPEC), Jan. 2006 – Dec. 2007.
Investigators: **R. Zane** (PI, ECE, UCB), D. Maksimović (ECE, UCB).
- Luna Innovations, “Phase II SBIR: RF Power Scavenging for Wireless Sensors,” Total: \$100K
Role: Co-PI, subcontract to Luna Innovations on US Navy/Air Force SBIR Contract No. N00164-
05-C-6088, program period: Nov. 2005 – Mar. 2007.
Investigators: Z. Popovic (PI, ECE, UCB), **R. Zane** (ECE, UCB).
- CU TTO, “Energy harvesting for maintenance free operation of wireless devices,” Total: \$100K:
Role: PI, Proof-of-Concept (POC) competition, program period: July 2006 – May 2007.
Investigators: **R. Zane** (PI, ECE, UCB), Z. Popovic (ECE, UCB).
- DARPA, “Planer Integrated Power Processor (PIPP),” Total: \$320K:

Role: PI, Phase I: Robust Integrated Power Electronics (RIPE), subcontract to General Electric, program period: Sep. 2005 – Aug. 2009.

Investigators: **R. Zane** (PI, ECE, UCB), D. Maksimović (ECE, UCB).

Intel, “High-frequency digital multi-phase controller and modulator,” Total: \$186K

Role: Co-PI, Colorado Power Electronics Center, program period: Jan 2005 – Dec 2006.

Investigators: D. Maksimović (PI, ECE, UCB), **R. Zane** (ECE, UCB).

Department of Education, “Batteryless power supplies for sensor technologies,” Total: \$150K:

Role: PI, subcontract to UCHSC, RERC-ACT “Rehabilitation Engineering Research Center on the Advancement of Cognitive Technologies,” program period: Jan 2005 – May 2007.

Investigators: Subcontract: **R. Zane** (PI, ECE, UCB). Prime contract: C. Bodine (PI, Assistive Technology Partners Director, Physical Medicine and Rehabilitation, UCHSC), M. Lightner (ECE, UCB).

NSF Faculty Early Career Development (CAREER) Program, “CAREER: Modeling, Control, and Design of Energy-Efficient Lighting Systems,” Total: \$400K + \$6K REU:

Role: PI, program period: Feb. 2004 – Jan. 2009.

Investigators: **R. Zane** (PI, ECE, UCB).

NSF, “SENSORS: Collaborative Research: Self-Configuring In Situ Wireless Sensor Networks for Prescribed Fire Management,” Total: \$300K:

Role: Co-PI, program period: Sept 2003 – May 2007.

Investigators: R. Han (PI, CS, UCB), **R. Zane** (ECE, UCB), L. Queen (School of Forestry, University of Montana), C. Seielstad (School of Forestry, University of Montana).

NASA Glenn Research Center, “Stability Control in PMAD Systems through Power Converter Modules with Direct Digital Control,” Total: \$74K,

Role: PI, program period: Aug 2003 – Nov. 2005.

Investigators: **R. Zane** (PI, ECE, UCB), D. Maksimović (ECE, UCB).

Artesyn Technologies, “Digital control in multiphase converters” Total: \$74K

Role: PI, Colorado Power Electronics Center (CoPEC), Jan. 2003 – Dec. 2005.

Investigators: **R. Zane** (PI, ECE, UCB), D. Maksimović (ECE, UCB)

Coleman Institute, “Feasibility study for CEMS-based chronic brain implants,” Total: \$370K:

Role: Co-PI, program period: Jan 2001 – Dec 2004.

Investigators: D. Restrepo (PI, Cell and Developmental Biology, Director Neuroscience, UCHSC), **R. Zane** (ECE, UCB), A. Sharp (Integrative Physiology, UCB), D. Finch (Mechanical Engineering, UCB).

DOE, “Modeling and IC-Control of High Frequency Electronic Ballasts,” Total: \$154K:

Role: PI, subcontract to General Electric, program period: Aug 2001 – Jul 2004.

Investigators: R. Zane (PI, ECE, UCB).

CoPEC associate memberships, various companies, Total: \$133K:

Role: Co-PI, Zilker Labs, 2003 – 2007, Intersil, 2003 – 2004, Northrop Grumman, 2005 – 2007.

Investigators: R. Erickson, D. Maksimović, **R. Zane** (all Co-PIs, ECE, UCB).

Philips Research, “Development of Solid-State LED Power Supply,” Total: \$30K:

Role: Co-PI, Colorado Power Electronics Center, Aug 2001 – Jul 2002.

Investigators: R. Erickson (PI, ECE, UCB), **R. Zane** (ECE, UCB).

Research Grants and Contracts Pending

Office of Naval Research, “Support on power converter controls: Compact Power Conversion Technologies (CPCT) ONR Phase I PROGRAM,” subcontract to Raytheon, Total: \$54K.

Role: PI, Jul 2009 – Dec 2009.

Investigators: **R. Zane** (PI, ECE, UCB), R. Erickson (ECE, UCB), D. Maksimovic (ECE, UCB).

Cirrus Logic, “Energy Efficient High Voltage Drive and Energy Recovery in Capacitive Load Drivers,” Total: \$107K.

Role: PI, Mar 2009 – Feb 2010.

Investigators: **R. Zane** (PI, ECE, UCB), R. Erickson (ECE, UCB).

The McKnight Foundation, “The Dynamic Brain Clamp,” Total: \$200K

Role: Co-PI, subcontract to UCHSC, UC-Denver, Aug 2009 – Jul 2010.

Investigators: D. Restrepo (PI, UCHSC, UCD), R. Zane (Co-PI, ECE, UCB).

TEACHING ACCOMPLISHMENTS

Teaching – Courses Taught

- Renewable Sources and Efficient Electrical Energy Systems, ECEN 2060.
 - Spring 2008: co-developed and co-taught this new sophomore level course as a first step in developing a new curriculum in energy and energy efficiency.
- Circuits / Electronics III, Introduction to Microelectronic Circuits, ECEN 3250, 5 credits, combined lecture and laboratory required core undergraduate course.
 - Fall 2006: 20 undergraduate.
 - Fall 2007: 33 undergraduate enrolled.
 - Received the 2008 John and Mercedes Peebles Innovation in Teaching Award, University of Colorado
- Introduction to Power Electronics, dual-listed ECEN 4797/5797
 - Fall 2001: 19 undergraduate, 20 graduate
- Power Electronics Laboratory, dual-listed ECEN 4517/5517
 - Spring 2004: 54 undergraduate (lecture included 10 graduate)
 - Spring 2005: 10 graduate
 - Spring 2006: 46 undergraduate (lecture included 16 graduate)
 - Spring 2007: 42 undergraduate and 10 graduate
 - Spring 2008: Co-developed and co-taught a major modification to the laboratory, with the new name: Power Electronics and Photovoltaic Power Systems Laboratory
 - Developed a mobile solar power system cart and re-designed the laboratory experiments to focus on power electronic components in the solar power system.
- Analog IC Design, dual-listed ECEN 4228/5228 – now ECEN 4827/5827
 - Spring 2002: 12 undergraduate, 22 graduate
 - Spring 2003: 26 undergraduate, 37 graduate
 - Spring 2004: 22 undergraduate, 27 graduate
 - Developed detailed course notes, additional assignments, and adjusted course content to create a two-semester sequence, with Analog IC as a prerequisite for Mixed-Signal IC.
 - Fall 2004: 14 undergraduate, 9 graduate
 - Detailed course notes posted online in place of a formal textbook. Additional changes made to syllabus to coordinate with mixed-signal IC design. Submitted formal course proposals for the two-semester IC design sequence.
- Mixed-Signal IC Design (new course developed in 2002), ECEN 5018 – Now ECEN 5837
 - Fall 2002: 15 graduate
 - Developed new course in Fall 2002, including detailed course notes (see website, ece.colorado.edu/~ecen5007), assignments, on-line tutorials for Cadence tools, and final project designs. Course notes are used in place of a formal text book.
 - Fall 2003: 22 graduate
 - Spring 2005: 21 graduate
 - Developed new on-line tutorials and two-week design assignments integrating theory and extensive use of CAD tools for complete custom IC design.
 - Spring 2006: 16 graduate
 - Spring 2008: 16 graduate
- Digital Control in SMPS, Industry Short Course, University of Colorado, Boulder, CO, July 2005, August 2006, August 2007. Enrolled 28 industry participants in two sessions three days each. Instructors: R. Zane, D. Maksimović, B. Miao.

- o Materials on digital control of SMPS from this course have now been integrated into ECEN 5807: Modeling and control of power electronic systems, with detailed notes, tutorials and simulation models posted online: <http://ece-www.colorado.edu/~ecen5807>
- Student evaluations on Faculty Course Questionnaire (FCQ) results for Instructor to date
 - a. *Fall 2006 and on:* 5.7, 5.4, 5.2, 4.3 (out of 6)
 - b. *Spring 2006 and before:* 1 A+, 2 A, 1 A-, 4 B+, 3 B

Graduate Final Thesis Examinations – Serving as Primary Advisor

1. Yang Zhang, Ph.D., “Digital control in modular masterless multiphase microprocessor power supplies,” August, 2006. Currently employed at National Semiconductor Corporation in Santa Clara, CA.
2. Yan Yin, Ph.D., “Modeling and IC control of electronic ballasts,” June 2004. Currently employed at National Semiconductor Corporation in Longmont, CO.
3. Preeti Bhandarkar, M.S. Thesis, “Design of a low-power sigma-delta A/D converter for chronic brain implants,” April 2004.

Graduate Final Examinations – Serving as Committee Member

1. Anmol Sheth, Ph.D., May 2007
2. Milan Ilic, Ph.D., Dec 2006
3. Xufeng Jiang, Ph.D., Dec 2006
4. Toru Takayama, M.S. thesis, Aug. 2006
5. Vahid Yousefzadeh, Ph.D., May 2006
6. Sitthipong Angkititrakul, Ph.D., Jan 2006
7. Hao Peng, Ph.D., Dec. 2005
8. Feng Zhao, Ph.D., Nov. 2004
9. Serguei Simonov, M.S. Thesis, May 2004
10. Ershad Ahmed, M.S. Thesis, April 2004
11. Asif Syed, M.S. Thesis, April 2004
12. Praneet Athayle, Ph.D., April 2004
13. Kusumal Changtong, Ph.D., May 2003
14. Aleksandar Prodic, Ph.D., May 2003
15. Joseph Hagerty, Ph.D., May 2003
16. Michael Vincent, M.S. Thesis, May 2002

Current Graduate Students – Serving as Primary Advisor (paid as RA or Fellowship)

1. Mariko Shirazi, Ph.D. candidate, passed comp. fall 2007, expected graduation: Feb. 2009.
2. Montu Doshi, Ph.D. candidate, passed comp. spring 2008, expected graduation: May 2009.
3. Jeff Morroni, Ph.D. candidate, passed comp. fall 2008, expected graduation: Dec. 2009.
4. Thurein Paing, Ph.D. candidate, passed comp. fall 2008, expected graduation: Dec. 2009.
5. Ryan Schnell, Ph.D. candidate, passed prelim 2007, expected graduation: Dec. 2009.
6. Qingcong Hu, Ph.D. candidate, passed prelim 2008.
7. Jieyeon Choi, Ph.D. candidate, entering program Aug. 2007.
8. Aaron Mattmiller, Ph.D. candidate, entered program Jan. 2008.
9. Arseny Dolgov, MS candidate, expected graduation: May 2008.

Past Graduate Students, Non-Thesis MS – Serving as Primary Advisor

1. Jim Patterson, M.S. graduate, May 2008.
2. Jeffrey Israel, M.S. graduate, May 2007.

3. Michael Weimer, M.S. graduate, May 2006.
4. Tony Carosa, M.S. graduate, Spring 2006.
5. Kevin Lybarger, M.S., expected graduation: May 2007.
6. Steve Scroggs, M.S. graduate, Fall 2005.
7. Sandra Johnson, M.S. graduate, Spring 2004.
8. Jonathan Gray, M.S. graduate, Fall 2002.

Undergraduate Students Advised and Independent Study

1. Danny Costinett, BS student, research on low power energy harvesting for wireless sensors, DLC apprentice, Aug. 2008 – present.
2. Dan Seltzer, MS/BS student, research on low power piezo-electric element drive circuit for aircraft wing integrity monitoring, Mar. 2008 – present.
3. Adam Bierman, MS/BS student, research on energy efficient lighting systems, Sep 2007 – present. Sponsored by NSF REU and IREE supplements, including international exchange in Spain.
4. Ryan Dolan, MS/BS student, research on lighting electronics, Jun 2007 – Dec. 2007.
5. Carey Davis, BS student, research on energy efficient lighting systems, DLC apprentice, Jan 2007 – May 2008.
6. Michael Weimer, MS/BS student, independent study in 2005 on harvesting power and electronics design for NSF Sensors project: Fire sensors.
7. Arseny Dolgov, B.S. candidate, research work on an NSF REU project in lighting electronics and on a Coleman Foundation project on wireless sensors, graduation: May 2007.
 - a. Received the **Dean's Outstanding Graduate for Research** award, May 2007.
8. Eric Hicks, independent study project, "A/D converter design and Cadence software tutorial development," Fall 2002.
9. Deirdre Lynch, independent study project, "Electronics 4 laboratory," Fall 2002.
10. Andrew Kowles, independent study project, "Analysis of resonant LCC circuits," Spring 2002.

SERVICE ACTIVITIES

Service – Conference Committees, Session Chair or Co-chair, other Outside Service

1. Associate Editor, IEEE Transactions on Power Electronics, Letters, Jan. 2006-present.
2. IEEE Power Electronics Society (PELS), Administrative Committee (AdCom)
 - a. Elected member-at-large, Jan 2008.
 - b. Attend all meetings (~3 per year at leading conferences), participate in e-mail discussions and society voting (~1 topic every two to three weeks)
3. IEEE Standards Committee, PAR 1789, "Recommending practices for modulating current in High Brightness LEDs for mitigating health risks to viewers," Dec. 2008 – present.
 - a. Participate in monthly teleconferences and online web forum discussions.
4. IEEE Applied Power Electronics Conference and Exposition (APEC) conference committee member (2001 – present)
 - a. *2005 Topic Chair for "General Electrical Design"*: responsible for assigning reviewers for ~80 paper submissions and organizing associated conference sessions.
 - b. *2005 and 2006 Web Content Editor*: responsible for soliciting and editing website content
 - c. 2005, 2006, 2007, 2009: Session chairman.
5. IEEE Power Electronics Specialists Conference (PESC) committee member (2001 – present)
 - a. Session chairman, 2004, 2005, 2006, 2008.
6. IEEE Power Electronics Society (PELS) Simulation, Modeling, and Control Committee member (June 2003 – present)

- a. Elected committee vice-chair (Dec 2006), secretary (July 2005).
 - b. Attend program meetings at IEEE APEC and PESC conferences; participate in planning the COMPEL (IEEE Workshop on Control and Modeling for Power Electronics) Workshops.
7. IEEE COMPEL 2006 Session Chairman (two sessions).
 8. IEEE Industrial Electronics Society Annual Conference (IECON) 2001 Session Chairman (two sessions)
 9. IEEE Denver Chapter; presented invited talk: R. Zane, Z. Popovic, “Harvesting ambient energy for low power sensors,” IEEE Presents Innovation and Technology in Colorado, Colorado Technology Week, Denver, CO, Oct. 2005.
 10. IEEE Solid-State Circuits Society: prepared an invited talk, “Custom IC blocks for enabling digital control in switching power converters,” as part of an invited lecture series for the Denver chapter monthly meetings, July 2003.
 11. Society memberships
 - a. IEEE Power Electronics Society
 - b. IEEE Industrial Applications Society
 - c. IEEE Industrial Electronics Society
 - d. IEEE Circuits and Systems Society
 - e. IEEE Solid State Circuits Society
 - f. IEEE Electron Devices Society

Service – Major Internal, University of Colorado at Boulder

- Course assessment teams, 2004 – present
 - a. Team member, ECEN 3250, Circuits III
 - b. Team member, ECEN 3100 Digital Logic
- Internal review committee, 2003
 - a. Participated in department review meetings, reviewed final committee report, participated in discussions with external review board
- Graduate studies committee, 2001-present
 - a. Participate annually in graduate student admissions, departmental teaching assistant (TA) offers and fellowships; periodic meetings on graduate studies and curriculum
- Chairman, power area Ph.D. preliminary examination committee
 - a. Committee chairman in 2002, 2005, 2007; committee member in 2003, 2004, 2006.
- Colorado power electronics center (CoPEC) faculty member
 - a. Assist in hosting annual CoPEC industry sponsor meeting and laboratory exposition and coordinate weekly group meetings with student presentations
 - b. Participate in student recruiting, curriculum development, and lab management

Service – Journal and Conference Paper Reviews

- IEEE Transactions on Power Electronics (full papers and letters) (~ 5 papers per year)
 - a. Associate editor, Letters (Jan. 2006 – present).
- IEEE Journal of Solid-State Circuits (~ 2 papers per year)
- IEEE Transactions on Circuits and Systems, Parts I & II (~ 2 papers per year)
- IEEE Industrial Applications Society Transactions (~ 1 paper per year)
- IEEE Transactions on Industrial Electronics (~1 paper per year)
- IEEE Transactions on Aerospace and Electronic Systems (1 paper, 2005)
- IEEE Transactions on Microwave Theory and Techniques (1 paper, 2007)
- Elsevier Microelectronics Journal (1 paper, 2007)

- IEEE Power Electronics Specialist Conference (PESC) (~ 10 papers per year)
- IEEE Applied Power Electronics Conference (APEC) (~ 10 papers per year)
- IEEE Workshop on Control and Modeling for Power Electronics (COMPEL) (~5 papers, biannual)
- IEEE International Symposium on Circuit and Systems (ISCAS) (~ 10 papers per year)
- IEEE Biomedical Circuits and Systems Conference, BiOCAS (1 paper, 2007)
- IEEE International Symposium on Industrial Electronics (ISIE) (~ 2 papers per year)

Service – Consulting Positions

- Nov 2008 – present: Cymbet Corporation, low power energy harvesting design consultant.
- May 2008 – present: Intelligent Automation Inc., low power piezo-electric driver design consultant.
- Jun. 2006 – present: Telegen / Vu1, electronic ballast design consultant.
- Oct. 2005 – Mar. 2007: Luna Innovations, low power management design consultant.
- Aug. 2005 – Dec. 2005: Intertainment, low power management design consultant.
- June 2005 – Dec. 2006: Intelligent Automation Inc., power converter design consultant.
- Dec. 2004 – May 2005: Cooley Godward LLP, patent consultant.
- Nov. 2004 – Jan 2005: ITU Ventures, technology consultant.
- Nov. 2004 – Dec. 2006: Winstead Sechrest & Minick P.C., patent consultant.
- May 2004: Zilker Labs, consultant on digital control and custom IC design in power converters.
- May 2004: Artesyn Technologies, 3-day short course on digital control in switching power converters.
- 2002 – 2005: Jet Propulsion Labs, University of Washington, Neptune Project Power Group Review Committee
- 2001 – 2005: General Electric Global Research, consulting on application of digital and custom mixed-signal IC controls in lighting electronics and related applications