

## Full Vita

### Ben Song

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### EDUCATION

Ph.D., 2001, Bradley Department of Electrical and Computer Engineering, Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, Virginia  
M.S., 1988, Department of Electrical Engineering, Chungnam National University, Taejeon, Korea  
B.S., 1986, Department of Electrical Engineering, Chungnam National University, Taejeon, Korea

Ph.D. Dissertation: "Voltage Balancing Techniques for Flying Capacitors used in Soft-Switching Multilevel Active Power Filters" Advisor: Dr. Jason Lai

### RESEARCH AREAS & TOPICS

- Modeling, analysis, design, implementation and test of alternate energy power conversion systems for smart-grid/Micro-Grid using Real-Time Digital Simulator (RTDS)
- Intelligent universal transformers for micro-grids
- Design and control of wind power/ water turbine Permanent magnet generators
- High energy efficient power converters and switched-mode power supplies
- LED lighting driver and power factor correction
- Advanced electric vehicle propulsion drive systems and their digital controllers
- Compact pulsed power system and energy storage system solutions for medical devices and defense applications

### EMPLOYMENT & EXPERIENCE

**2009 – Present** Assistant Professor, Department of Electrical and Computer Engineering, Baylor University, Waco, Texas  
**2004 – 2009:** Founder, CEO/President, and CTO, ActsPower Technologies, Inc., San Diego, CA  
**2000 – 2004:** Sr. Scientist and Staff Engineer, Electromagnetic Systems Div., Energy Products Div., General Atomics - Electronic Systems Inc., San Diego, CA  
**1994 – 2000:** Ph.D. Student and Graduate Research Assistant, Center of Power Electronics Systems (CPES), Virginia Tech, Blacksburg, VA  
**1988 – 1994:** Senior Project Engineer, Power Electronics Div., Korea Electrotechnology Research Institute (KERI), Changwon, Korea  
**1991:** Project Engineer, T.U. Braunschweig, Braunschweig, Germany

### SELECTED IEEE & JOURNAL PUBLICATIONS

- E. S. Kim, B. M. Song, and S. Lee, "An Effective Control Algorithm for a Grid-connected Multifunctional Power Converter," *International Journal of Modern Engineering*, vol. 10, no. 2, pp. 10-16, April 2010.
- B. M. Song, S. Lee, and M. H. Kye, "Practical Soft-Switching High-Voltage Dc-Dc Converter for Magnetron Power Supplies," *International Journal of Engineering Research & Innovation*, vol. 2, no.1, pp. 30-35, May 2010.
- S. Lee, B. M. Song, and T. H. Won, "Evaluation of a Software Configurable Digital Controller for the Permanent Magnet Synchronous Motor using Field-Oriented Control," *International Journal of Engineering Research & Innovation*, vol. 2, no.2, Nov. 2010 (accepted).
- B. M. Song, R. McDowell, A. Bushnell, and J. Ennis, "A Three-Level DC-DC Converter with Wide-Input Voltage Operations for Ship-Electric-Power-Distribution Systems," *IEEE Transactions on Plasma Science*, October 2004, pp. 1856-1863.
- B. M. Song and J. Ennis, "Component Technologies of Pulsed Power System," *Korea Power Electronics Journal (Special Issue - Pulsed Power Technology, Invited Paper)*, February 2004, pp. 26-31.
- H. Yu, B. M. Song and J. S. Lai, "Design of a Novel ZVT Soft-switching Chopper," *IEEE Transactions on Power Electronics*, Vol. 17, No. 1, January/February 2002, pp. 101-108.
- X. Jia, Q. Li, J. S. Lai, and B. M. Song, "Analysis of Poly-phase Brushless Exciter," *IEEE Transactions on Industry Applications*, Vol. 37, No. 6, November/December 2001, pp. 1720-1726.
- J. S. Lai, B. M. Song, R. Zhou, A. R. Hefner, Jr., D. W. Berning, and C. C. Shen, "Characteristics and Utilization of a New Class of Low On-Resistance MOS-Gated Power Device," *IEEE Transactions on Industry Applications*, Vol. 37, No. 5, September/October 2001, pp. 1182-1289.
- B. M. Song, J. H. Kim, J. S. Lai, K. C. Seong, H. J. Kim, and S. S. Park, "A Multilevel Soft-Switching Inverter with Inductor Coupling," *IEEE Transactions on Industry Applications*, Vol. 37, No. 2, March/April 2001, pp. 628-636.

- B. M. Song and J. S. Lai, "A Novel Two-Quadrant Soft-Switching Converter with One Auxiliary Switch for High Power Applications," *IEEE Transactions on Industry Applications*, Vol. 36, No. 5, September / October 2000, pp. 1388-1395.
- S. K. Kwon, B. M. Song, and J. S. Lai, "Design Optimization of the ZVT Soft-Switching Inverter for High Power AC Motor Drives," in *Journal of Electrical Engineering and Information Science*, Vol. 4, No. 4, August 1999, pp. 507-513.

#### SELECTED CONFERENCE PAPERS

- J. Y. Choi, J. M. Jang, and B. M. Song, "Design of a Direct-Coupled Radial-Flux Permanent Magnet Generator for Wind Turbines," *IEEE 2010 PES General Meeting*, July 2010, 2010GM1532.
- B. M. Song, M. H. Kye, and R. Y. Kim, "Design of a Cost-Effective DC-DC Converter with High Power Density for Magnetron Power Supplies," *2010 International Power Electronics Conference (IPEC)*, 21-24 Jun. 2010, pp. 137-141.
- B. M. Song, K. C. Chang, and S. Lee, "Design of an Outer-Rotor-Type Permanent Magnet Motor for Electric Scooter Propulsion Systems," *2010 International Power Electronics Conference (IPEC)*, 12-24 Jun. 2010, pp. 2763-2742.
- B. M. Song, B. Garner, and S. Steinbach, "Design Feasibility of a New Fluid Vortex Energy Capturing System," *IEEE 2010 Green Technologies Conference (GTC)*, Apr. 15-16, 2010, pp. 1-4.
- S. Lee, B. M. Song, and T. H. Won, "Evaluation of a Software Configurable Digital Controller for the Permanent Magnet Synchronous Motor using Field-Oriented Control," *IEEE 2010 The Southeastern Symposium on System Theory (SSST)*, Mar. 7-9, 2010, pp. 302-306.
- G. H. Kim, Y. J. Kim, M. Park, I. K. Yu, and B. M. Song, "RTDS-based Real Time Simulations of Grid-Connected Wind Turbine Generator Systems," *IEEE 2010 Applied Power Electronics Conference (APEC)*, Feb. 22-25, 2010, pp. 2085 -2090.
- E. S. Kim, B. M. Song, and K. Y. Lee, "Modeling and Analysis of a Grid-Connected Wind Energy Conversion System Using PSCAD/EMTDC," *IEEE 2010 PES Conference on Innovation Smart Grid Technologies*, Jan. 19-21, 2010, pp. 1-6.
- B. M. Song, K. Y. Lee, and S. Nikneshan, "The Cyber Security Solution for SCADA Power Systems using Software Defined Radio (SDR) Technology," *National Workshop on New Research Directions for Future Cyber-Physical Energy Systems*, June 2009.
- A. H. Bushnell, B. M. Song, J. Ennis, R. Miller, D. Johnson, and Maenchen, "Design Optimization of Linear Transformer Driver (LTD) Stage Cell Capacitors," in *Conf. Rec. of IEEE International Power Modulator Conference*, May 2004.
- B. M. Song, R. McDowell, A. Bushnell, and J. Ennis, "Practical Design and Control of a ZVS 3-Level DC-DC Converter with Minimum Circulating Current," in *Conf. Rec. of IEEE-IECON'2003*, pp. 726-731, Nov. 2003
- J. B. Ennis, B. M. Song, A. H. Bushnell, R. A. Cooper, J. Jichetti, F. MacDougall, R. McDowell, B. Andermatt, and J. Bates, "Custom Design of Components and Power Supplies for Pulsed Power Systems," in *Conf. Rec. of IEEE-IECON'2003*, pp.87-92, Nov. 2003
- B. M. Song, R. McDowell, and A. Bushnell, "A Three-Level DC-DC Converter with Wide-Input Voltage Operations for Ship-Electric-Power-Distribution Systems," in *Conf. Rec. of IEEE-PPC'2003*, Dallas, TX, Jun. 2003.
- D. W. Yoo, J. W. Baek, H. S. Son, G. H. Rim, and B. M. Song, "Full Digital 150V-1kA ZVS Converter for X-ray Power Applications," in *Conf. Rec. of IEEE-PPC'2003*, Dallas, TX, Jun. 2003.
- J. W. Baek, D. W. Yoo, G. H. Rim, and B. M. Song, "A 2kV-40A Pulse Generator Using Boost Converter Array," in *Conf. Rec. of IEEE-PPC'2003*, Dallas, TX, Jun. 2003.
- B. M. Song, R. Kratz, and S. Gurol, "Contactless Inductive Power Pickup System for Maglev Applications," in *Conf. Rec. of IEEE-IAS*, pp. 1586-1591, Oct. 2002.
- B. M. Song, J. S. Lai, C. Y. Jeong, and D. W. Yoo, "A Soft-Switching High-Voltage Active Power Filter with Flying Capacitors for Urban Maglev System Applications," in *Conf. Rec. of IEEE-IAS*, pp. 1461-1468, Oct. 2001.
- H. Yu, W. Dong, B. M. Song, and J. S. Lai, "Variable Timing Control for Coupled-Inductor Feedback ZVT inverters," in *Conf. Rec. of International Power Electronics & Motor Control Conference (IPEMC)*, Aug. 2000, pp. 1138-1143.
- B. M. Song, N. Yadlapalli, and J. S. Lai, "A Novel Auxiliary Resonant Snubber Converter for Switched Reluctance Motor Drives," in *Conf. Rec. of International Power Electronics Conference (IPEC) -Tokyo '2000*, Apr. 2000, pp. 560-565.
- B. M. Song, H. Zhu, J. S. Lai, and A. R. Hefner, Jr., "Switching Characteristics of NPT- and PT-IGBTs under Zero-Voltage Switching Conditions," in *Conf. Rec. of IEEE-IAS*, Oct. 1999, pp. 722-728.
- B. M. Song, J. S. Lai, and S. K. Kwon, "Design Criteria of the Auxiliary Resonant Snubber Inverter Using Load-side Circuits for Electric Propulsive Drives" in *Conf. Rec. of ICPE'98*, Oct. 1998, pp. 145-150.
- Y. Tang, H. Zhu, B. M. Song, J. S. Lai, and C. C. Chen, "EMI Experimental Comparison of PWM Inverter Between Hard- and Soft-switching Techniques," in *Conf. Rec. of IEEE-WPET'98*, Detroit, Oct. 1998, pp.71-77.
- B. M. Song, S. R. Lee, and J. S. Lai "An improved Three-Phase auxiliary Resonant Snubber Inverter for AC Motor Drive Applications" in *Conf. Rec. of IEEE-PESC*, June 1998, pp. 423-428.
- S. C. Oh, B. M. Song, Y. H. Cho, and H. D. Ha, "Design of New AC Power Train using 2 Quadrant Chopper as an Input converter," in *Conf. Rec. of 12th Int'l Electric Vehicle Symposium*, Anaheim, California, Dec. 1994, pp.634 - 639.

#### PROFESSIONAL ASSOCIATIONS AND ACTIVITIES

- Institute of Electrical and Electronics Engineers (IEEE), Senior Member
- Technical Program Committee Member & Paper Reviewer of IEEE 2010 Green Technologies Conference.
- Session Chair and Paper Reviewer of IEEE 2010 Southeastern Symposium on System Theory (SSST)
- Session Chair and Paper Reviewer of IEEE 2010 International Power Electronics Conference (IPEC)
- Paper Reviewer of IEEE 2010 Applied Power Electronics Conference and Exposition (APEC)
- Paper Reviewer of IEEE Transaction on Energy Conversion - 2010
- Session Chair and Paper Reviewer of IEEE 2010 International Power Electronics Conference (IPEC)
- Paper Reviewer of IEEE Industry Applications Society and Power Electronics Society
- Member of IEEE Power & Energy (PES), Power Electronics (PELS), and Industry Applications (IA) Societies.

#### HONORS AND AWARDS

- 2004: International Who's Who of Professionals
- 2000: Paper Award, International Power Electronics Conference (IPEC) 2000, Tokyo, Japan
- 1999: TECO Academic Scholarship, Virginia Tech, Blacksburg, VA
- 1993: Outstanding Researcher Award, Ministry of Science and Technology, Korea
- 1992: Outstanding Researcher Award, KERI, Korea
- 1987: Thesis Award / Full Scholarship for Master Degree, Korea Electric Power Research Institute, Korea
- 1983: Two-Year Full Scholarship, Chungnam National University, Korea