Valentin Bolborici, PhD

vbolborici@utep.edu
500 W University Ave, El Paso, TX 79968
Tel.: 915-747-5822

EDUCATION

Doctor of Philosophy **2004-2009**
University of Toronto, Department of Electrical and Computer Engineering
Thesis: Modeling of the Stator of Piezoelectric Traveling Wave Rotary Ultrasonic Motors
Advisors: Professors Francis P. Dawson and Mary C. Pugh

Master of Applied Science **1998-1999**
University of Toronto, Department of Electrical and Computer Engineering
Thesis: Design of Low Profile Transformers for High Frequency Operation
Advisor: Professor Douglas J. Lavers

Bachelor of Applied Science, *with distinction* (average of 91%) **1987-1992**
University of Craiova, Department of Electrical and Computer Engineering
Thesis: Design of AC Drives with Induction Motors and Inverters Used in Transportation
Advisor: Professor Doru Nicola

APPOINTMENTS

Assistant Professor, Electrical Engineering**,** University of Texas at El Paso, TX **2011- present**
Post-Doctoral Fellow, University of Toronto, Canada **2009-2011**
Research Assistant, University of Toronto, Canada **2004-2011; 1998-1999**
Lecturer and Head Teaching Assistant, University of Toronto, Canada **2004-2009**
Senior Electrical Engineer, Hitachi Ltd Japan, Hitachi City, Japan & **2002-2004**
Hitachi Canada Ltd., Mississauga, ON Canada
Electrical Engineer, MacDonald Dettwiler Space and Advanced Robotics Ltd, **1999-2002**
Brampton, ON Canada
Test Engineer, American Sensors Electronics Inc., Toronto, ON Canada **1995-1997**
Electrical Engineer, Procomtrans Ltd. Craiova 1**992-1995**

DISTINCTIONS AND AWARDS

Department of Defense - Army Research Lab Grant **2015**
Edward S. Rogers Sr. Graduate Scholarship **2007-2008**
Thomas Noakes Graduate Scholarship in Science and Technology **2006**
Natural Sciences and Engineering Research Council of Canada
Postgraduate Scholarship (doctoral level). **2004-2006**
President's Award for Excellence, Hitachi Canada Ltd. **2003**
University of Toronto Master's Fellowship **1998-1999**

TEACHING EXPERIENCE

University of Texas at El Paso
Developed and taught 2 undergraduate level courses and 2 graduate level courses:

Electric Circuits I EE2350 **2013-2015**
- Developed the course material
- Delivered lectures to undergraduate students
- Marked in-class assignments
- Graded mid-term examinations and final examinations
- Coordinated the entire course activity

Energy Conversion EE3385 **2012-2015**
- Developed the course material
- Designed evaluation tools for testing the background knowledge for the course
- Delivered lectures to undergraduate students
- Marked the assignments submitted by the students
- Graded quizzes, mid-term examinations, and final examinations
- Coordinated the entire course activity

Power Electronics EE4395/EE5390 **2011-2015**
- Developed the course material
- Designed evaluation tools for testing the background knowledge for the course
- Delivered lectures to graduate and undergraduate students
- Marked the assignments submitted by the students
- Graded quizzes, mid-term examinations, and final examinations
- Coordinated the entire course activity

Control of Electric Power EE4395/EE5390 **2012-2015**
- Developed the course material
- Designed evaluation tools for testing the background knowledge for the course
- Delivered lectures to graduate and undergraduate students
- Marked the assignments submitted by the students
- Graded quizzes, mid-term examinations, and final examinations
- Coordinated the entire course activity

Individual Studies EE5391 **2012-2015**
- Provided guidance and support for four master and one Ph.D. students
- Marked the reports submitted by the students
- Evaluated the performance of the students

University of Toronto, Canada
Taught 4 undergraduate level courses:

Lecturer and Head Teaching Assistant **2006-2007**
Switch-Mode Energy Conversion ECE 315F
- Delivered lectures to undergraduate students
- Performed laboratory presentations
- Supervised laboratory sessions, including a team of three teaching assistants
- Designed evaluation tools for testing the background knowledge for the course
- Marked reports and evaluated the performance of students during the laboratory hours

Teaching Assistant **2006**
Electric and Magnetic Fields ECE 221H1S
- Prepared and delivered weekly tutorials for a class of 45 students
- Demonstrated problem solving during tutorials using the methods taught in lectures
- Provided individual guidance to students experiencing difficulties in the course, during weekly office hours
- Graded quizzes and assisted with mid-term exams

Teaching Assistant **2005**
Switch-Mode Energy Conversion ECE 315F
- Assisted in the development of new laboratory experiments for a redesigned course
- Planned and facilitated weekly laboratory sessions for a class of 75 undergraduate students
- Assisted students in the execution of laboratory experiments of switch-mode energy conversion circuits
- Marked reports and evaluated the performance of students during lab hours

Teaching Assistant **2005**
Electromechanical Energy Conversion ECE 315S
- Prepared and conducted weekly laboratory sessions for a class of 90 undergraduate students
- Assisted students in the execution of laboratory experiments of electromechanical energy conversion circuits
- Marked reports and evaluated the performance of students during lab hours

Teaching Assistant **1999**
Introductory Electronics ECE 231S
- Planned and conducted weekly laboratory sessions for a class of 60 undergraduate students
- Assisted students in the execution of laboratory experiments of electronic circuits
- Marked reports and evaluated the performance of students during lab hours

Teaching Assistant **1998**
Circuit Theory ECE 212F
- Prepared and facilitated weekly laboratory sessions for a class of 50 undergraduate students
- Assisted students in the simulation of electric circuits with PSPICE simulation software
- Marked reports and evaluated the performance of students during lab hours

RESEARCH EXPERIENCE

University of Texas at El Paso

Assistant Professor **2011-present**

- Designed and built an electric power laboratory for research and testing of hybrid electric energy storage systems and piezoelectric traveling wave rotary ultrasonic motors
- Supervise one Ph.D. student and four M.A.Sc. students
- Perform research on the electro-thermal modeling of ultracapacitors and batteries
- Perform research on the modeling of piezoelectric traveling wave rotary ultrasonic motors
- Wrote and submitted five NSF grant proposals and one industry grant proposal
- Wrote and submitted a grant proposal to the Army Research Lab (White Sands Missile Range)
- Published papers in professional journals (IEEE and Elsevier Ultrasonics)

University of Toronto

Research Assistant, Post-doctoral level **2009-2011**

Research Topic: Modeling of Hybrid Electrical Energy Storage Systems
Advisor: Professor Francis P. Dawson

- Worked on the electro-thermal modeling of Li-ion batteries and ultracapacitors
- Worked on the modeling of electrical energy storage systems containing Li-ion batteries and ultracapacitors
- Designed and built a test setup that allows the determination of the parameters of Li-ion batteries and ultracapacitors models, as well as for the studying of the behavior of electrical energy storage systems containing Li-ion batteries and ultracapacitors
- Submitted and published a paper at the IEEE Energy Conversion Congress & Exposition, Phoenix, Arizona, 2011

Research Assistant, Doctoral level **2004-2009**

Research Topic: Modeling and control of piezoelectric traveling wave rotary ultrasonic motors
Advisors: Professors Francis P. Dawson and Mary C. Pugh

- Analyzed and simulated existing models and control methods for piezoelectric traveling wave rotary ultrasonic motors
- Implemented for the very first time the finite volume method in the modeling of piezoelectric devices taking into account the basic theoretical principles from piezoelectricity and structural mechanics
- Generated the finite volume models for a simple piezoelectric plate, a unimorph piezoelectric plate, and the stator of a piezoelectric traveling wave rotary ultrasonic motor. Compared the results of the finite volume models with finite element simulations and experimental results.
- Designed and implemented the Matlab code for the finite volume models of the following piezoelectric devices: a simple piezoelectric plate, a unimorph piezoelectric plate, and the stator of a piezoelectric traveling wave rotary ultrasonic motor. The code for each model has approximately six thousands lines
- Investigated the construction and operating principle of an ultrasonic motor with two sensors. Modified an ultrasonic motor with one sensor into one with two sensors. Experimentally validated the operating principle of the ultrasonic motor with two sensors

- Designed and built an experimental test platform for simple piezoelectric plates. The test platform consists of a metal base with a piezoelectric plate mounted on it, a function generator, a power amplifier, and an oscilloscope
- Designed and built an experimental test platform for piezoelectric traveling wave rotary ultrasonic motors. The test platform consists of a metal base with an ultrasonic motor coupled to a hysteresis brake, a microprocessor-controlled motor driver, and a brake controller

Research Assistant, Master's level **1998-1999**

Research Topic: Design and optimization of high frequency electromagnetic components for an asymmetric switching power supply.

Advisor: Professor Douglas J. Lavers

- Analyzed existing design methods of high frequency inductors and transformers used in high frequency switching power supplies
- Performed loss comparison in the design of high frequency inductors and transformers for different design methods
- Evaluated several ferrite core structures used in high frequency transformers
- Investigated the copper losses for different types of windings (magnet wire, foils, and Litz wire)
- Designed and implemented an optimization method for the design of low profile pot core transformers for high frequency operation

PROFESSIONAL EXPERIENCE

Assistant Professor

University of Texas at El Paso **2011-present**

- Developed from scratch the course material for the following courses: "Industrial Electronics", "Control of Electric Power", "Energy Conversion", and "Electric Circuits"
- Deliver lectures to undergraduate and graduate students
- Mark in-class assignments and homework submitted by students, grade quizzes, mid-term examinations and final examinations, and coordinate the courses activity
- Supervise one Ph.D. student, four master students, and one undergraduate student
- Designed and built an electric power laboratory for research and testing of hybrid electric energy storage systems and piezoelectric traveling wave rotary ultrasonic motors
- Perform research on the electro-thermal modeling of ultracapacitors and batteries
- Perform research on the modeling of piezoelectric traveling wave rotary ultrasonic motors
- Wrote and submitted five NSF grant proposals and one industry grant proposal
- Wrote and submitted a grant proposal to the Army Research Lab (White Sands Missile Range)
- Published papers in professional journals (IEEE and Elsevier Ultrasonics)
- Serve as reviewer for IEEE Transactions on Power Electronics, Elsevier Ultrasonics, and Elsevier Wave Motion
- Serve as a member in defense committees for graduate students

Postdoctoral Fellow

University of Toronto, Canada **2009-2011**

- Worked on the electro-thermal modeling of Li-ion batteries and ultracapacitors

- Worked on the modeling of electrical energy storage systems containing Li-ion batteries and ultracapacitors
- Designed and built a test setup that allows the determination of the parameters of Li-ion batteries and ultracapacitors models, as well as for the studying of the behavior of electrical energy storage systems containing Li-ion batteries and ultracapacitors
- Wrote reports and performed presentations of research at Honeywell Aerospace
- Submitted and published a paper at the IEEE Energy Conversion Congress & Exposition, Phoenix, Arizona, 2011

Senior Electrical Engineer **2002-2004**
Hitachi Japan Ltd., Hitachi, Japan
Hitachi Canada Ltd., Mississauga

- Modeled and designed an electrical AC drive with field-oriented control of an induction motor used in transportation
- Performed simulations in Simulink and dSPACE simulation platforms for an electrical AC drive with a field-oriented controlled induction motor
- Trained Japanese field service engineers in the construction, operation, and troubleshooting of electrical AC drives. Also, designed the training material
- Elaborated the instructions manual for an electrical AC drive

Electrical Engineer 1999-2002
MacDonald Dettwiler Space and Advanced Robotics Ltd., Brampton

- Designed the analog interface for a communications board used for the Shuttle Remote Manipulator System (Canada Arm) ground support equipment. Also developed the test plan and performed the worst-case analysis
- Designed a load module used for the Shuttle Remote Manipulator System ground support equipment. Also, developed the test plan and performed the worst-case analysis
- Wrote the C code for an 8051 microcontroller used in a space camera for the International Space Station. Also, simulated the code with Keil software
- Wrote the VHDL code and performed the simulation, synthesis, place and route, and programming for an Actel FPGA that worked in configuration with the 8051 micro-controller
- Designed and implemented the VHDL code for a Xilinx FPGA used for image processing in a space camera. Also, performed synthesis, placing and routing.
- Wrote Version Description Documents and the Design Description Documents for FPGAs
- Created documents such as Tooling Lists and Manufacturing Instruction Sheets
- Performed proton radiation tests on flight equipment at the University of British Columbia.
- Performed presentations for Preliminary Design Reviews and Critical Design Reviews of the designs in front of the NASA engineers
- Trained and supervised junior engineers about the specific analog design used in equipment for space applications
- Provided the necessary training for NASA employees in the operation of the equipment produced by the company

Test Engineer **1995-1997**
American Sensors Electronics Inc., Toronto
- Designed customized testing equipment for the production line
- Designed, constructed, and tested a prototype of an opacity meter
- Developed applications based on micro-controllers used in test equipment for CO detectors
- Solved technical problems regarding high voltage transients in smoke alarms
- Created the required specifications for buzzers used in the smoke alarm systems
- Provided technical support for production
- Elaborated service and training documentation and procedures
- Supervised the transfer of the production line to Juarez, Mexico

Electrical Engineer **1992-1995**
Procomtrans Ltd., Craiova
- Assisted in the design of electrical/electronic hardware for industrial equipment
- Assisted in troubleshooting and recommended maintenance solutions for industrial equipment
- Provided on-line technical support for company's customers
- Supervised the procedure related to service activity

AFFILIATIONS & SERVICE ACTIVITIES

- **Reviewer**, Elsevier Wave Motion **2015**
- **Reviewer**, Elsevier Ultrasonics **2013-present**
- **Reviewer,** IEEE Transactions on Power Electronics **2010-present**
- **Reviewer,** IEEE Energy Conversion Congress & Exposition **2013**
- **Liaison** between the Electrical Engineering Department and Library **2013-present**
- **Member,** M.A.Sc. Defense Committee at UTEP **2012**
- **Member,** Institute of Electrical and Electronics Engineers (IEEE) **2009-present**
- **Student Member,** Institute of Electrical and Electronics Engineers (IEEE) **2006-2009**

PUBLICATIONS

- **V. Bolborici** and F. P. Dawson, "Coupled Circuit Based Representation of Piezoelectric Structures Modeled Using the Finite Volume Method", Elsevier Ultrasonics, vol. 66, page(s) 103-110, 2016.
- **V. Bolborici**, F. P. Dawson, and K. K. Lian, "Hybrid Energy Storage Systems: Connecting batteries in parallel with ultracapacitors for higher power density", IEEE Industry Applications Magazine, July/August 2014.
- **V. Bolborici**, F. P. Dawson, and M. C. Pugh, "A finite volume method and experimental study of a stator of a piezoelectric traveling wave rotary ultrasonic motor", Elsevier Ultrasonics, Volume 54, Issue 3, page(s): 809-820, March 2014.
- **V. Bolborici,** F. P. Dawson, and M. C. Pugh, "Modeling of composite piezoelectric structures with the finite volume method", IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control, Volume: 59, No. 1, page(s): 156-162, January 2012.

- **V. Bolborici**, F. P. Dawson, and K. K. Lian, "Sizing Considerations for Ultracapacitors in Hybrid Energy Storage Systems", IEEE Energy Conversion Congress & Exposition, Phoenix, Arizona, 2011, page(s): 2900-2907.
- **V. Bolborici**, F. P. Dawson, and M. C. Pugh, "Modeling of piezoelectric devices with the finite volume method", IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control, Volume: 57, No. 7, page(s): 1673-1691, July 2010.
- **V. Bolborici** and J.D. Lavers, "Optimized low profile, high frequency pot core transformers, Digests of the Intermag" Conference, 2000.
- J. D. Lavers and **V. Bolborici,** "Loss comparison in the design of high frequency inductors and transformers", IEEE Transactions on Magnetics, Volume: 35, Issue: 5, Part 2, page(s): 3541-3543, September 1999.
- **V. Bolborici**, "Radio remote control for an electric car model", Tehnium Magazine, page(s): 2-3, March 1990.

TEACHING AND ACADEMIC DEVELOPMENT

Jumpstart Your Research, University of Texas at El Paso **2013-2014**
The program included:
- Personal development plan
- Career Plan: Tenure and Promotion
- Finding external funding sources
- Lifetime of a proposal for research and sponsored projects

Electric Energy Systems Curriculum for Sustainability, Minneapolis, Minnesota **2014**
The workshop included:
- Describing and disseminating the developed undergraduate curriculum
- Developing the graduate curriculum through recent ONR funding
- Creating a large and vibrant community of teaching/learning scholars
- Provide details of various projects tasks in conjunction with ONR 6.1 Program Review

Electric Energy Systems Curriculum for Sustainability, Napa Valley, California **2013**
The workshop included:
- Describing and disseminating the developed undergraduate curriculum
- Developing the graduate curriculum through recent ONR funding
- Creating a large and vibrant community of teaching/learning scholars

Collaborative Faculty Mentoring Program, University of Texas at El Paso **2011-2012**
The program included:
- Creating your professional development plan
- Designing courses with a progression of learning experiences
- Managing interruptions
- Get a handle on your email
- What to establish in your classroom
- Use of laptops in the classroom: research and best practices
- Getting students to act on our feedback

- Should professors use Facebook to communicate with students?
- Strategies for cultivating PERMA in effectively integrating your teaching, research, and service efforts.
- What adult learners can teach us about all learners.
- Reasons for why my students don't like group work and I do it anyway.
- Helping difficult students read difficult texts.

Prospective Professors in Training Program, University of Toronto 2008
A full year training and mentorship program run by the Faculty of Applied Science and Engineering at the University of Toronto that trains future professors in the three main areas of teaching, research and administrative service. Topics covered include teaching, evaluation, research planning, funding proposals, managing time, money and students etc., such that there is an elevation of the level of skill, understanding and engagement in the widest range of academic and teaching issues possible within the time constraints of the program.

MIE3002 – Engineering, Teaching and Learning 2006
A course that examines effective teaching practices and issues in undergraduate engineering education.

Teaching Assistants' Training Program, University of Toronto
Advanced University Teaching Preparation Certificate 2007-2008
A two-year extensive training program meant to prepare graduate students interested in pursuing a career in academic teaching for the demands and rewards of university teaching. The program provided me with the opportunity to expand my understanding of teaching and learning and to practice teaching in a supportive environment. Through interactive workshops, a practicum and the preparation of a teaching dossier, I received focused, practical feedback on my own teaching practice and developed skills and documents that would take me through my postsecondary teaching career.

Teaching Assistants' Training Program, University of Toronto
Teaching Fundamentals Certificate 2006
This one-year certificate was meant to introduce participants to effective teaching strategies and techniques and to broaden their understanding of how undergraduate students learn.

Leadership Development Program, University of Toronto 2006
A program that focuses on personal leadership, group leadership, organizational leadership and civic leadership.

PROFESSIONAL DEVELOPMENT

- **COMSOL Intensive Training, Denver, Colorado 2013**
- **Microchip Applications Seminars, Toronto 2007**
- **COMSOL Advanced Modeling Features Training Session, Toronto 2007**
- **Career Development Workshops, University of Toronto 2006**
- **ICAT International Smart Actuator Symposium, Penn State University 2004, 2005**
- **dSPACE training, Hitachi, Japan 2003**

- **Xilinx Advanced FPGA Tools and Design (v3.x) Seminar, Mississauga 2001**
- **VHDL training, MDSAR Ltd. Brampton 2000**
- **Microchip Applications Seminars, American Sensors Inc. Toronto 1995, 1996, 1997**