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## Current Research and Professional Interests

Design of power electronic energy conversion systems for motor drive and renewable energy applications utilizing multilevel inverter/converter topologies. Research and development of new methods for improving the overall efficiency, reliability, and power quality of power electronic energy conversion equipment and electric machines utilized in industrial applications, microgrids, and mature power systems.

## Work History

### **Research Assistant in Electric Machines and Drives Laboratory** (Spring, Summer, and Fall, 2014)

Marquette University, Milwaukee, WI (20 hours per week to finance 100% of education expenses)

- Thesis topic: Investigating various software strategies to mitigate/eliminate common mode voltage and its adverse effects on electric machinery and peripherals including bearing currents and electromagnetic interference (EMI) in Neutral Point Clamped (NPC) multilevel inverter-based motor drives.
- Assisted in the design, fabrication, programming and testing of a three-level, 7 kVA NPC inverter for motor drive applications.
- Researching novel methods for open-switch fault detection, identification, and fault-tolerant control strategies for NPC and ANPC multilevel inverters used in safety-critical applications.

### **Teaching Assistant for Department of Electrical and Computer Engineering** (Spring and Fall 2013, Spring 2015)

Marquette University, Milwaukee, WI (10 hours per week to finance 50% of education expenses)

- Digital Electronics (EECE 2030): Provided tutorial support to help students gain an understanding of topics related to digital logic design and circuit analysis. Responsible for grading and proctoring course examinations and quizzes.
- Digital Electronics Laboratory (EECE 3015): Assisted students in the design, assembly, and testing of digital electronic devices and microcontroller systems. Responsible for grading laboratory reports and providing students with feedback of their overall progress.
- Principles of Design of Power Systems Protection and Monitoring (ELEN 4240): Responsible for grading homework assignments and assisting undergraduate students with course materials and assignments.

### **Laboratory Technician/Lead Maintenance Technician** (2003 – 2012)

Trostel, Ltd., Whitewater, WI (48 hours per week to finance 25% of education expenses)

- Responsible for the design and startup of pump seal lifetime test control system utilizing NI Labview Supervisory Control and Data Acquisition (SCADA) module interfaced with networked programmable logic controllers (PLCs).
- Responsible for the design, installation, and startup of thirteen rubber compression molding machine retrofit industrial control systems to improve reliability and productivity. Supervised overhaul of mature hydraulic systems.
- Provided training to a team of maintenance technicians to improve their skills troubleshooting problems with automated parts assembly systems and their associated electrical and mechanical control systems.
- Researched and proposed new methods for maximizing production efficiency by reducing cycle time and standardizing equipment, procedures, and documentation.
- Performed numerous electrical, mechanical, and software modifications and enhancements including the design and implementation of redundant electrical safety systems for rubber injection molding machinery.
- Experience with PLC programming and hardware interfacing, motion controllers, DC/AC motor drives setup/programming, and PID loop tuning of temperature related process control systems.

### Field Service Technician (1998 – 2003)

Rubber Molding Technology, Eastlake, OH (45 hours per week)

- Performed rubber injection molding machine installations, repairs, troubleshooting, and electrical system calibrations.
- Electrical controls upgrades, mechanical modifications, and software enhancements.
- Provided customers with technical support and troubleshooting procedures on-site, via email, and by phone.
- Industrial control panel fabrication, wiring, and documentation.

### Student Worker for Automation Department (1994 – 1997)

Lorain County Community College, Elyria, OH (20 hours per week to finance 15% of education expenses)

- Prepared laboratory exercises for credit and non-credit courses. Maintained automation systems and industrial robots. Laboratory Instructional Assistant for credit and non-credit Allen Bradley PLC 5/SLC 500 courses.
- Volunteer for French Creek Nature Center's Dinosaur exhibit – installed and programmed control system interfaced with Allen Bradley SLC 500 PLCs.

## Education

### Master of Science, Electrical Engineering (2012 – Present)

Marquette University, Milwaukee, WI (40 hours per week). Cumulative GPA: 3.89

Expected graduation date: May, 2015

### Bachelor of Science, Electrical Engineering Technology (2004 – 2012)

Milwaukee School of Engineering, Milwaukee, WI (25 hours per week). Cumulative GPA: 3.95

Waukesha County Technical College, Pewaukee, WI (25 hours per week). Cumulative GPA: 4.00

### Associate of Applied Science, Automation Engineering Technology (1994 – 1997)

Lorain County Community College, Elyria, OH (40 hours per week). Cumulative GPA: 3.34

## Related Coursework

- Design and Analysis of Electric Machines and Drives
- Dynamic Analysis of Advanced Electric Machines (Synchronous and Asynchronous)
- Transients and Surges in Electric Power Systems
- Design of Power Systems Protection and Monitoring
- Power Systems Analysis
- Electric Machines and Transformers
- Energy Efficiency and Renewables for Buildings
- Electromechanical Energy Conversion
- Feedback Control Systems

## Memberships and Awards

- Selected for Who's Who Among Students in American Universities and Colleges award.
- Student member, Institute of Electrical and Electronic Engineers (IEEE) since 2006.
- Member of IEEE Power and Energy Society Chapter.
- Committee member, Waukesha County Technical College Industry Advisory Board.
- Actively involved in Preparing Future Faculty program at Marquette University.

## Publications

- Jiangbiao He, **Chad Somogyi**, Andrew Strandt, and Nabeel A.O. Demerdash, "Diagnosis of Stator Winding Short-Circuit Faults in an Interior Permanent Magnet Machine." 2014 IEEE Energy Conversion Congress and Exposition (ECCE), Pittsburgh, PA, Sep 14-18, 2014.

### **Software Experience**

- Microsoft Office Suite: Report, spreadsheet, and presentation generation.
- NI Multisim: DC/AC circuit simulation, transient circuit analysis.
- NI Labview: Testing of anti-lock braking system encoders, hydraulic control of elevator system.
- Matlab/Simulink: State-space modeling and dynamic simulation of synchronous turbogenerators and permanent magnet motors, transients in power transmission lines, feedback control systems.
- PLECS: PWM-based common mode voltage mitigation strategies for three level NPC multilevel drives.
- TI CCS: C2000 DSP controller programming for power converters.
- Mathcad: Transmission line impedance, analytical and graphical solutions of complex mathematical functions.
- Visual C++: Power factor correction, noise filtering of periodic signals.
- Autocad Electrical: Generation of electrical, hydraulic, and pneumatic diagrams and schematics.
- Quickfield: Electric fields of coaxial cable and parallel plate capacitors, magnetic fields of magnetic circuits.

### **Skills and Abilities**

- Focused, organized, and articulate interpersonal communication skills.
- Ability to effectively apply technical knowledge and propose solutions by performing research.
- Clear, concise, and detail-oriented technical writing skills.
- Efficient time-management and organizational skills.
- Ability to work independently or with individuals from diverse backgrounds.
- Thoughtful and considerate customer relations and support skills.

### **Hobbies & Other Interests**

- Professional sound reinforcement. Music recording, production, and remixing.
- Small scale electrical and electronic projects.
- Tutoring students with difficulties in math and science.
- Helping family and friends with building projects, renovations, and solving electrical problems.
- Cooking, camping, hiking, and international travel.