

Matthew Kelly McDonough

800 West Campbell, EC33 Richardson, Texas 75080
972-883-3503 · matthew.mcdonough@utdallas.edu

EDUCATION

The University of Texas at Dallas
PHD, Electrical Engineering

Arlington, TX
Expected Graduation Date: December 2014

The University of Texas at Arlington
BSEE, GPA 3.67/4.0

Arlington, TX
May 2010

RESEARCH INTEREST

- Renewable energy systems; design and integration
- Modeling, design, and control of power electronics
- Multi-port converters
- Automotive electrification

SKILLS and TECHNIQUES

- C++, LabView
- Matlab, Simulink
- PLECS
- PSpice, Cadence
- DSP/ μ C programming- Code Composer Studio, MPLAB
- Power electronics control and motor drive
- PCB Design-Altium
- PCB population, Soldering
- Power electronics modeling, simulation, and control
- Magnet, Maxwell, HFSS, Ansoft Designer, Pro-E
- Machining and Fabrication
- Lean/Six Sigma

RESEARCH EXPERIENCE

Wireless Power Transfer and Multi-Port Power Electronics Interface for Automotive Applications (PhD Dissertation)

- Designed, developed, and tested 3 kW reduced scale wireless power transfer system.
- Designed, developed, and tested multiport converter for onboard EV applications.
- Simultaneous control of: wireless transceiver (3kW), battery-pack (1kWh), ultra-capacitors, and resistive load (3kw).

Multi-Port Power Electronics Interface- 'EV' Charger

- Developed and tested multiport converter with the specific application of charging 'EV-like' loads (Golf Carts).
- Converter simultaneously controls 2.5kW solar panel array, 15kWh of battery storage, single phase utility connection (3kW), and two 1.44 kW DC loads (golf carts).
- Converter field tested since November, 2012.
- Applications range from uninterruptable power supply to renewable energy integration and micro-grids.

Compact Buck/Boost Converter with Smooth Transition Between Buck and Boost Modes (300 W) (Sponsored-GE)

- Built, programmed, and debugged 300 W buck/boost converter operating at 250 kHz.
- Implemented advanced control algorithm to create smooth transition between buck and boost modes.

Dual 500W GaN/Si Solar Micro-Inverter

- Designed and built full bridge forward converter and inverter.
- Design featured modular interface to utilize either advanced eGaN or traditional Si semiconductors.
- Applications ranged from single solar panel micro-inverter for grid tied or island mode applications to isolated motor drive applications such as water pump/purification.

100W, 500kHz GaN Boost Converter

- Designed and built 100W Boost Converter using advanced eGaN semiconductor technology switching at 500 kHz

GaN and SiC (2.5kW/5kW) Switched Reluctance Motor Drives

- Maintained and repaired eGaN and SiC switched reluctance motor drives

Reluctance Motor Optimization

- Optimized design of a permanent magnet-less reluctance based motor for local industry partner.
- Utilized extensive finite element and analytical tools to boost power and efficiency of conceptual motor.

LEADERSHIP EXPERIENCE

Power Electronics Thrust Area Leader

- Managed 8 research engineers on projects that include: VHF (60 MHz) boost converters, 5kW motor drives, 10kW motor drives, 100kW switched reluctance motor drive, solar micro-motor-drive (500W), piezo-electric actuators, split phase rectifier/SRM motor drive, wireless power transfer for biomedical applications.

Industry Application Society (IEEE IAS)

- Consulted on the design and implementation of a Tesla coil with particular emphasis on power electronics and PCB design and implementation.

IFEC 2013

- Led a team of undergraduate engineers to participate as finalists in the International Future Energy Challenge, 2013.
- Built 500W Solar Micro-Inverter using advanced wide band-gap semiconductors
- Reduced the cost of the inverter to less than ten cents per watt.

IFEC 2011

- Consulted and provided advice for a team of undergraduate engineers participating as finalists in the International Future Energy Challenge, 2011. The team won the “Best Undergraduate Educational Impact Award.”

PREVIOUS EMPLOYEMENT

Corning Cable Systems, Engineering Intern (Keller, TX)

Nov. 2007-2010

Corning inc. is the world leader in specialty glass and ceramics and currently employs over 24,000 people. Corning Cable Systems, Keller manufacturing plant, specializes in fiber optic hardware and equipment.

- Initiated a LEAN project, streamlining a production line from raw materials received to shipment of final product resulting in shorter cycle times and higher inventory turns.
- Participated on numerous teams with a variety of projects including automation, LEAN manufacturing, and product improvements.
- Led a project installing and integrating a production monitoring system; est. savings \$45K/yr.
- Audited multiple vendors for quality assurance resulting in fewer returns and higher productivity.

Techlight USA, Parts Manufacturing (Cleburne, TX)

Nov. 2006-Nov. 2007

Techlight USA is a 19 year old landscape lighting company with a manufacturing facility of over 100,000 square feet.

- Operated CNC Machine to fabricate parts for production needs with strict deadlines.
- Trouble shooting and repair of CNC machine, including electrical components, software issues, and mechanical failures.

PROFESSIONAL SOCIETY MEMBERSHIPS AND SERVICES

- *IEEE Member*
- *IEEE IAS Member(UTD chapter)*
- *Session Chair/Reviewer, IEEE APEC '14*
- *Reviewer, IEEE ITEC '14*
- *Reviewer, IEEE ISIE '12*
- *Session Chair/Reviewer, IEEE VPPC '11*

FIRST AUTHOR-JOURNAL PAPERS

- **McDonough, M.**; Fahimi, B., "Comparison between coil geometries and core types for use in Wireless Power Transmission," *Industrial Electronics, IEEE Transactions on*, 2014 *IEEE* (under review)

FIRST AUTHOR-CONFERENCE PAPERS

- **McDonough, M.**; Shamsi, P.; Fahimi, B., "Dynamic modeling of ICPT considering misalignment and speed of vehicle," *Vehicle Power and Propulsion Conference (VPPC), 2011 IEEE* , vol., no., pp.1,6, 6-9 Sept. 2011
- **McDonough, M.**; Shamsi, P.; Fahimi, B., "Application of multi-port power electronic interface for contactless transfer of energy in automotive applications," *Vehicle Power and Propulsion Conference (VPPC), 2011 IEEE* , vol., no., pp.1,6, 6-9 Sept. 2011
- **McDonough, M.**; Shamsi, P.; Fahimi, B., "Application of Multi-port Power Electronic Interface: Plug-in Electric Vehicle Charging Platform," *Industrial Electronics (ISIE), 2012 IEEE International Symposium on* , vol., no., pp.975,980, 28-31 May 2012
- **McDonough, M.**; Shamsi, P.; Fahimi, B., "Application of multi-port power electronic interface for contactless transfer of energy in automotive applications," *Vehicle Power and Propulsion Conference (VPPC), 2011 IEEE* , vol., no., pp.1,6, 6-9 Sept. 2011
- **McDonough, M.**; Fahimi, B., "Comparison between circular and square coils for use in Wireless Power Transmission," *International Conference on Computation Electromagnetics (CEM), 2014 IEEE*,
- **McDonough, M.**; Shamsi, P.; Fahimi, B., "Reduction of EMI effects in Motor Drives and Complex Power Electronic Systems" *Compumag, 2013*

Co-authored papers available upon request.

PERSONAL STATEMENT

Outside of school and work, I enjoy many outdoor sports such as mountain biking, football, and jogging. I have a great relationship with my family who has instilled in me a passion for excellence. I have recently married the love of my life and we are looking for a place to start our new life together.