

## **Speaker of Session 09**

## MICROELECTRONIC DEVICES FOR ENERGY EFFICIENCY



KATCHA, JASON

Expert in the development of power electronics for renewables and energy storage systems, including grid-tie inverter design, energy storage control, advanced digital control systems using FPGA technology.

**EDUCATION** 

Marquette University, Milwaukee, WI **MSEE** 1994

Milwaukee School of Engineering, Milwaukee, WI BSEE 1988

## **RELATED EXPERIENCE**

GE Healthcare, CT Engineering, Waukesha, WI

Principal Engineer, Power

Leading advanced technology development for power sub-system of \$1B CT Imaging Business. Developing 150kW li-ion energy storage system for back-up power and peak-shaving, including gridtie inverter and battery management system. Working with UWM researchers to test and select Li-ion cells. Developed novel 150kW Contactless Power transfer system, consisting of a high-frequency rotary transformer and resonant power converter using latest generation low-loss IGBTs. Developed high performance FPGA-based digital control using Matlab / Simulink and Altera DSPBuilder simulation and auto-code generation techniques. Developed novel high-frequency magnetics, gate drive circuits, and thermal management. Developed 150kW high-frequency Isolation and Power Distribution system. Developed 150kW Ultra-capacitor energy storage system for energy recovery and peak power shaving.

GE Healthcare, X-ray Engineering, Buc, France

Project Leader

1999 - 2001

Led 10 person design team in the development of 100kW, 140kV, HV power supply for CT scanners operating under 20G rotational forces. Led subsystem design including selection of IGBT based series-



2001 – Present

resonant converter and HV XFMR/rectifiers topologies. Led development of inverter design including high current power board and thermal strategy. Led design team through concept, detailed design, prototype development and risk retirement. Responsible for \$1.5M development budget. Delivered high quality prototypes on time for CT system integration in Milwaukee. The design is still in production with over 2000 units in operation world-wide.

GE Healthcare, MR Engineering, Waukesha, WI

## Lead Engineer

Designed high performance Power Amplifiers for MRI scanners. Developed 3-axis amplifier and power supply architecture. Designed 1300V, 250A switching amplifier consisting of 2 stacked H-bridges operating at 35kHz. The amplifiers provide 10kHz voltage bandwidth while delivering 300kW of peak power. Designed analog control board and gate drivers. Developed thermal algorithm to allow system to utilize full amplifier performance. Designed 3-output 15kW series-resonant power supply and associated control bd and gate drive. Developed novel analog PWM controller for the 3 outputs. Led development of sub-system from concept to introduction with over 1500 amplifier sub-systems installed.

GE Healthcare, Nuclear Imaging Engineering, Radlett, England	
Edison / Development Engineer	1988 – 1990
Designed high speed analog signal processing circuitry for Nuclear Imaging.	
All Digital Power, LLC, Whitefish Bay, WI	
President	2010 – Present
Consulting for solar and wind power developments. Digital control for power ele	ectronics.
UW-Milwaukee, MI	
Adjunct Lecturer	2013 – Present
Teaching "Power Electronics" and "Renewable Energy Systems" classes.	
PUBLICATIONS AND PRESENTATIONS	
"FPGA-based Digital Control Development with Altera DSP-Builder"	
Professional Tutorial, IEEE ICRERA, Milwaukee, WI	2014
"FPGA-based Digital Control Development with Altera DSP-Builder"	

Industrial Presentation, IEEE APEC, Long Beach, CA

3rd International Symposium on Energy Challenges and Mechanics - towards a big picture 7-9 July 2015, Aberdeen, Scotland, United Kingdom

Aberdeen, Scotland, UK



1991 - 1999





"Li-ion Energy Storage for a CT System"		
Oral Presentation, GE Research Power Electronics Symposium, Munich, Germany	2013	
"An FPGA-based Digital Control Development Method for Power Electronics"		
Scientific Paper and Poster, IEEE IECON, Montreal, QC	2012	
"FPGA-based Digital Control Development with Matlab/Simulink and Altera DSP Builder"		
Technical Tutorial, IEEE IECON, Montreal, QC	2012	
"Thermal Model for NMR Gradient Driver Improves Performance for Arbitrary Waveforms"		
Oral Scientific Presentation, ISMRM, Sydney, Australia	1998	
US PATENTS		
8,085,075 "Method and System for Diagnostic Imaging using a digital PLL"	2011	
7,957,786 "Methods and Apparatus for Communicating Signals"	2011	
7,717,619 "Contactless Power and Data Transmission Apparatus"	2010	
7,593,502 "Methods and Apparatus for Fast Rotation Speed Scanners"	2009	
7,522,705 "Power Handling Methods and Apparatus"	2009	
7,197,113 "Contactless Power Transfer System"	2007	
7,110,488 "X-ray Generator and Slipring for a CT System"	2006	
7,079,619 "System and Method for Data Slipring Connection"	2006	
7,054,411 "Multi-channel Contactless Power Transfer System"	2006	
5,646,835 "Series Resonant Converter"	1997	

