Chia-Chou Yeh

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2008

CAREER OBJECTIVE

To seek a technology oriented full-time position which will fully utilize my technical research experiences in electric machines and adjustable-speed drives, power electronics, modeling and control of electric motor drives, as well as fault diagnosis of electric machinery drive systems, and their corresponding fault tolerant strategies.

KEY SKILLS

- Broad knowledge and multidisciplinary background in electric machines and drives, power electronics, fault diagnosis, fault tolerant operations, DSP based real-time control systems, and various simulation platforms.
- Industrial design experience in motor soft-starters, UPS, active rectifiers, and medium voltage wye motor starting.
- Proven ability to take new ideas from concept through design, simulation, and to hardware implementation.
- Self motivated, excellent problem-solving skill, good hands-on skill, good team player, and always keen to learning new technology to enhance my knowledge in my field of specialization.

EDUCATION

08/2003 – Present	**Marquette University,** Milwaukee, WI	
	Ph.D. Candidate in Electrical and Electronic Engineering	**QPA: 3.91/4.0**
	Major: Electric Machines and Drives, Power Electronics	
	Minor: Control Systems and Digital Signal Processing	
	Dissertation: *Fault Tolerant Operations of Electric Machine-Drive Systems*	
	Advisor: Prof. Nabeel A. O. Demerdash	
05/2003	**Marquette University,** Milwaukee, WI	
	M.Sc. in Electrical and Electronic Engineering	**QPA: 3.82/4.0**
	Major: Electric Machines and Drives, Power Electronics	
	Thesis: *Investigation of the Effects of Space Harmonics on Performance of AC and Brushless DC Machines using PSpice*	
	Advisor: Prof. Nabeel A. O. Demerdash	
05/2000	**Marquette University,** Milwaukee, WI	
	B.Sc. in Electrical and Electronic Engineering	**QPA: 3.74/4.0**
	Minor: Computer Science	

INDUSTRIAL EXPERIENCE

05/2003 – 02/2007   **Power Electronics Engineer**, Innovation Center
     Eaton Corporation, Milwaukee, WI

- Two-Phase Motor Soft-Starter: Developed and tested a novel closed-loop two-phase soft starter control scheme which provides reduced motor starting current transients and torque pulsations. Proposed approach allows low-cost and reduced-size two-phase soft starter topology to be developed. Other responsibility includes conducting a comprehensive comparative evaluation and technical review of soft starters from different competitors for performance and feature assessment.

- Reconfigurable UPS for Multiple Power Quality Applications: Designed, built, and tested a new modular per-phase UPS prototype based on reduced-switch-count configuration. Appealing features include simple and cost-effective design, active front-end filtering (reactive and harmonic power compensation), dynamic voltage sag compensation which avoid necessity of booster or series transformer to save cost, seamless transition between normal and backup mode during power failures, impervious to load variations, and improved power conversion efficiency. Control platform was implemented using Analog Devices DSP.

- Medium Voltage Wye Motor Starting: Validated concept through simulations to alleviate starting transients of induction motor under medium voltage excitation in addition to power factor correction of utility mains using point-on-wave (POW) switching of asynchronous modular contactors.

01/1999 – 08/1999　　**Electrical Engineering Co-op**
06/1998 – 08/1998　　　R.R. Donnelley & Sons Company, Dwight, IL

- Assisted engineers and technicians with project development in which duties include designing, programming, installing, and troubleshooting industrial controls (Allen-Bradley PLC's) and drives.

- Responsible for programmed and installed an Allen-Bradley Panelview monitor for the Drive Replacement Project. Managed and coordinated the linking of the existing control program and data collection program to the new drive program. Wrote the graphics and control software for the monitor and worked with the startup team to put the drive in production. The drive started up on schedule and within budget.

- Developed data collection system using Wonderware InTouch. Successfully programmed, installed, and established communication between A-B PLC's and Wonderware program. Project was on time and within budget.

- Prepared and managed cost estimates for the above projects.

ACADEMIC EXPERIENCE

08/2003 – Present　　　**Ph.D. Research Assistant**, Electric Machines and Drives Diagnostics Laboratory
　　　　　　　　　　　Marquette University, Milwaukee, WI

Projects sponsored by U.S. NSF

- Fault Tolerant Soft Starter: Designed, built and experimentally tested a fault tolerant soft starter when experiencing SCR open-circuit or short-circuit switch-fault in any one of the phases. Proposed approach had demonstrated reduced starting motor torque transients and inrush current magnitude, and can be easily retrofitted into the existing off-the-shelf soft starters with no significant cost increase. Control platform was implemented using TI TMS320F2812 DSP.

- Induction Motor Stator Fault Mitigation: Developed a stator winding inter-turn fault mitigation (self-healing/limp-home) strategy for induction motor. Proposed technique allowed the motor to operate in two-phase mode by isolating the faulty phase and reducing the short-circuit loop current, while still maintaining continuous operations. Simulation motor model under abnormal condition was developed using *Winding Function Approach* and the *Time-Stepping Finite-Element Approach* (Magsoft Flux-2D).

- Fault Tolerant Drive: Designed, built and tested a fault tolerant drive capable of mitigating transistor open-circuit and short-circuit switch faults for low-speed applications. Proposed approach required only minimum hardware modifications to the conventional off-the-shelf three-phase drive, with only the addition of SCRs and fast-acting fuses. Control platform was implemented using TI DSP.

- Reconfigurable Induction Motor for Fault Emulation: Designed and tested a reconfigurable induction motor for experimental emulation of stator inter-turn and rotor broken bar faults. This motor would eliminate the need to permanently destroy machine components such as stator windings or rotor bars when acquiring data from a faulty motor for fault diagnostic studies. Joint effort with A. O. Smith Corporation.

- Stator and Rotor Fault Diagnosis using AI technique: Developed a fault diagnostic method for stator and rotor faults using AI-based statistical machine learning approach. Simulation (using FEA) and experimental validations of proposed technique had been performed. Test work was carried out at Rockwell Automation and A. O. Smith Corporation.

Fall 2006   **Part-Time Instructor**, Department of Electrical and Computer Engineering
                   Marquette University, Milwaukee, WI
                   Course Taught: *EECE109 Electrical Circuits and Machinery*

08/2000 – 05/2003 **Graduate Research Assistant**, Electric Machines and Drives Diagnostics Laboratory
                   Marquette University, Milwaukee, WI

- Analyzed the effects of space harmonics on performance of ac and brushless dc machines using PSpice.

01/1998 – 05/1998 **Computer Service Technician**, Information Technology Service Department
                   Marquette University, Milwaukee, WI

HONORS / AWARDS

- Recipient of prestigious Rev. John P. Raynor, S.J. Fellowship, 08/2007 – Present.
- Recipient of Research Assistantship Sponsored by U.S. National Science Foundation, 08/2003 – 05/2006.
- Recipient of Marquette University Graduate Teaching Assistantship, 08/2001 – 05/2002.
- Recipient of U.S. Department of Education Graduate Assistance in Areas of National Need (GAANN) Fellowship, 08/2000 – 07/2001.
- Certified as Engineer-in-Training by the Department of Regulation and Licensing in the State of Wisconsin, 2000 – Present.
- Awarded Marquette University College of Engineering High Scholastic Honors, 2000.
- Member of Tau Beta Pi, 1998 – Present.
- Student Member of IEEE, 1999 – Present.
- Member of Eta Kappa Nu, 2000 – Present.
- Member of Phi Mu Epsilon, 2000 – Present.
- Member of Sigma Xi, 2005 – Present.
- Listed in Who's Who In America, 2007.

PROFESSIONAL / UNIVERSITY ACTIVITIES

- Reviewer for:
  Journal
  - IEEE Transactions on Power Electronics.
  - IEEE Transactions on Energy Conversion.
  - IEEE Transactions on Industry Applications.
  - IEEE Transactions on Industrial Electronics.

  Conference
  - IEEE International Electric Machines and Drives Conference, 2005, 2007.
  - IEEE Industry Applications Society Annual Meeting Conference, 2005, 2006, 2007.
  - IEEE Industrial Electronics Society Conference, 2005, 2006, 2007.
  - IEEE Applied Power Electronics Conference and Exposition, 2004, 2005, 2007, 2008.
  - IEEE Power Electronics Specialists Conference, 2004, 2007.
- Publication in the Proceedings of the 2002 Sigma Xi Poster Symposium at Marquette University.

SKILLS

Design: Analog and Digital Circuit Design, Microprocessors, PSpice, AutoCAD, Orcad
Programming: C/C++, FORTRAN, Assembly Language, HTML, Matlab/Simulink, Simplorer, LabView, A-B PLC-5, A-B Panelview, Wonderware InTouch
DSP Platforms: TI TMS320F281x Fixed-Point, Analog Devices ADMC401
FEA: Magsoft Flux-2D, MagneForce
Languages: English, Chinese

GRADUATE COURSEWORK

- Design and Analysis of Electric Machines in Adjustable Speed Drives
- Modern Control Theory
- Advanced Electric Machinery
- Power Electronics
- Finite Element Analysis of Electric Machines
- Principles of Design of Power System Protection
- Condition Monitoring and Fault Diagnosis of Electric Machines
- Nonlinear and Adaptive Control
- Digital Control Systems
- Digital Signal Processing
- Advanced Engineering Mathematics
- Probability and Random Processes in Engineering

PUBLICATIONS

Journal

1. **Chia-Chou Yeh**, Madhav D. Manjrekar, "*A Reconfigurable Uninterruptible Power Supply System for Multiple Power Quality Applications*," IEEE Transactions on Power Electronics. Vol. 22, No. 4, pp. 1361-1372, July 2007.

2. **Chia-Chou Yeh**, Gennadi Y. Sizov, Ahmed Sayed-Ahmed, Nabeel. A. O. Demerdash, Richard J. Povinelli, Edwin E. Yaz, Dan M. Ionel, "*A Reconfigurable Motor for Experimental Emulation of Stator Winding Inter-Turn and Broken Bar Faults in Polyphase Induction Machines*," Accepted for Publication in the IEEE Transactions on Energy Conversion.

3. Ahmed Sayed-Ahmed, **Chia-Chou Yeh**, Behrooz Mirafzal, Nabeel A. O. Demerdash, "*Analysis of Stator Winding Inter-Turn Short-Circuit Faults in Induction Machines for Identification of the Faulty Phase*," Submitted for Journal Review to the IEEE Transactions on Industry Applications. September 2007.

Conference

1. **Chia-Chou Yeh**, Nabeel A. O. Demerdash, "*Fault Tolerant Operations in Adjustable-Speed Drives and Soft Starters for Induction Motors*," IEEE Power Electronics Specialists Conference. 38th Annual IEEE PESC'07 Orlando, Florida. pp. 1942-1949, 17-21 June 2007.

2. **Chia-Chou Yeh**, Nabeel A. O. Demerdash, "*Induction Motor-Drive Systems with Fault Tolerant Inverter-Motor Capabilities*," IEEE International Electric Machines and Drives Conference. 6th IEEE IEMDC'07 Antalya, Turkey. Vol. 2, pp. 1451-1458, 3-5 May 2007. (**Invited Paper**)

3. **Chia-Chou Yeh**, Gennadi Y. Sizov, Ahmed Sayed-Ahmed, Nabeel. A. O. Demerdash, Richard J. Povinelli, Edwin E. Yaz, Dan M. Ionel, "*A Reconfigurable Motor for Experimental Emulation of Stator Winding Inter-Turn and Broken Bar Faults in Polyphase Induction Machines*," IEEE International Electric Machines and Drives Conference. 6th IEEE IEMDC'07 Antalya, Turkey. Vol. 2, pp. 1413-1419, 3-5 May 2007. (**Invited Paper**)

4. Ahmed Sayed-Ahmed, **Chia-Chou Yeh**, Behrooz Mirafzal, Nabeel A. O. Demerdash, "*Analysis of Stator Winding Inter-Turn Short-Circuit Faults in Induction Machines for Identification of the Faulty Phase*," IEEE Industry Applications Society Annual Meeting Conference. 41st Annual IEEE IAS'06 Tampa, Florida. Vol. 3, pp. 1519-1524, 8-12 October 2006.

5. **Chia-Chou Yeh**, Behrooz Mirafzal, Richard J. Povinelli, Nabeel A. O. Demerdash, "*A Condition Monitoring Vector Database Approach for Broken Bar Fault Diagnostics of Induction Machines*," IEEE International Electric Machines and Drives Conference. 5th IEEE IEMDC'05 San Antonia, Texas. Vol. 1, pp. 29-34, 15-18 May 2005.

6. **Chia-Chou Yeh**, Madhav D. Manjrekar, "*A Reconfigurable Uninterruptible Power Supply System for Multiple Power Quality Applications*," IEEE Applied Power Electronics Conference and Exposition. 20th Annual IEEE APEC'05 Austin, Texas. Vol. 3, pp. 1824-1830, 6-10 March 2005.

7. **Chia-Chou Yeh**, Richard J. Povinelli, Behrooz Mirafzal, Nabeel A. O. Demerdash, "*Diagnosis of Stator Winding Inter-Turn Shorts in Induction Motors Fed by PWM-Inverter Drive Systems Using a Time-Series Data Mining Technique*," IEEE International Power System Technology Conference. POWERCON'04 Singapore. Vol. 1, pp. 891-896, 21-24 November 2004.

8. Behrooz Mirafzal, Fariba Fateh, **Chia-Chou Yeh**, Richard J. Povinelli, Nabeel A. O. Demerdash, "*Condition Monitoring of Squirrel-Cage Induction Motors Fed by PWM-Based Drives Using a Parameter Estimation Approach*," IEEE International Power System Technology Conference. POWERCON'04 Singapore. Vol. 2, pp. 1579-1584, 21-24 November 2004.

9. **Chia-Chou Yeh**, Madhav D. Manjrekar, "*A Single-Phase UPS System Based on TRINITY Converter Topology Using Voltage-Regulated Current-Controlled Feedback Control Approach*," IEEE Power Electronics Specialists Conference. 35th Annual IEEE PESC'04 Aachen, Germany. Vol. 6, pp. 4128-4134, 20-25 June 2004.

10. **Chia-Chou Yeh**, Nabeel A. O. Demerdash, "*A Study of the Effects of Machine Winding Space Harmonic and Advanced Phase Current Switching on Torque and Performance Quality in Brushless DC Motors Using PSpice Modeling*," IEEE International Electric Machines and Drives Conference. 4th IEEE IEMDC'03 Madison, Wisconsin. Vol. 2, pp. 826-832, 1-4 June 2003.

REFERENCES

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