

ABDUL R. OFOLI, Ph.D., P.E.

U.C. Foundation Assistant Professor, Electrical Engineering, UTC

College of Engineering & Computer Science

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RESEARCH INTEREST

- ❑ **Power & Energy**
 - Power Electronics; Power System; and Sustainable Energy.
- ❑ **Controls**
 - Motion Drives and Control; Application of Intelligent Controls.
- ❑ **Automotive**
 - Diesel engine and after-treatment (emission) controls development.
 - Virtual sensors development for engine and after-treatment systems.

EDUCATION

- ❑ **May 2006: Ph.D.** in Electrical Engineering; Howard University, Washington DC. Major in advance/intelligent controls application.
- ❑ **May 2003: M.Eng.** degree in Electrical Engineering from Howard University, Washington DC. This degree was a major in power system application and controls.
- ❑ **July 1999: B.Sc.** degree in Electrical & Electronic Engineering; Graduated with first class honors from Kwame Nkrumah University of Science and Technology(KNUST), Kumasi, Ghana.

PROFESSIONAL REGISTRATION

- ❑ Registered Professional Engineer (PE) in the State of Tennessee, 2013.

PROFESSIONAL EXPERIENCE

ACADEMIC

Assistant Professor,

Aug '10 – Present

The University of Tennessee at Chattanooga, Tennessee USA

- Teach Electrical engineering courses and labs
 - Courses taught includes: Circuits I (ENEE 2700), Circuits II (ENEE 2720), Analog Electronics and Lab (ENEE 3720 & 3720L), Power Electronics and Lab (ENEE 5610, ENEE 4600 & 4600L), Instrumentation -includes LabVIEW and PLC (ENEE 4800) and Linear Controls and Drives Lab (ENEE 4790).
- Developing new labs for power electronics, control & drives and upgrading the PLC lab.

Research Assistant,

Spr '03 – Spr '06

Howard University, Washington DC

Developed and implemented real-time control algorithms for industrial applications using advance digital control, adaptive control techniques and intelligent control for alternative energy systems, drives, automation and power networks. Hardware implementation of most of these control techniques were illustrated using industrial standard rapid prototyping tools like dSPACE systems.

ABDUL R. OFOLI, Ph.D., P.E.

Teaching Assistant,

Fall '04 – Spr '06

Howard University, Washington DC

Developed and wrote experimental procedures and guidelines for the interdisciplinary undergraduate system dynamics and control laboratory to enhance quality of instruction at the university. Taught the following lab sessions, *linear controls lab*, *energy conversion lab*, and *introduction to electrical engineering lab*. Graded lab reports, mid-term and final exam papers.

INDUSTRIAL

Senior Controls Engineer,

July '06 – June '10

Cummins Inc., Columbus Indiana, USA

Some Responsibilities: (i) Develop and implement real-time control algorithms and strategies for diesel automotive applications to meet specific control objectives utilizing classical, advanced and intelligent control techniques. (ii) Implemented and validated real-time diagnostic and control algorithms on various diesel engines platforms using rapid controls prototyping systems. (iii) Developed electronic hardware and software controls for waste heat recovery systems and electric hybrid-diesel power systems.

Internship Experience,

Summer 1998

Benso Oil Palm Plantation, Unilever, Ghana.

Major task included redesigning the one-line power diagram of the main factory while a minor assignment involved the design and implementation of control circuits for the protection of factory motors. A final project was to conduct and estimate the monthly power consumption for all small businesses around the factory housing units for billing purposes, which were then operating without any billing. Projected increase in profit averaged 10% annually if implemented. Attended a one week workshop training on "*Improving Energy efficiency and minimizing of energy wastage in industries*".

COMPUTER SKILLS:

- Skilled with Microsoft Office Applications, Windows and UNIX Operating System.
- Skilled with Mathematical, Design and Electronic Simulation Tools: P-Spice Schematics, Simulink, MATLAB, and LABVIEW.
- Skilled with Information Technology Applications: Web-Page Publishing, FrontPage, and HTML

SERVICE

- Mentored the TVA/JC-Penney High school Robotic team in the area of LabVIEW programming and the use of electrical sensors in their robot; went to the regional competition in Knoxville with the team in 2012.
- Mentored high school students to develop and build projects such as: "Fuzzy Logic Control of a PV powered Display Board", and "Multimedia Display of Arching Fault Detection" during the EESI summer 2001 program.
- Tutored and mentored high school students in mathematics, science and engineering basics during the EESI program in summer 2002.
- Lead the organization of the annual Department of Energy (DOE)/National Renewable Energy Laboratory (NREL) Renewable Energy Academic Partnership conference held at Howard University in August 2002.

BOOK CHAPTER:

- "Multilayer Fuzzy Controller for Control of Power Networks," Chapter 17, *Advanced Fuzzy Logic Technologies in Industrial Applications*, Edited by Ying Bai, Hanqi Zhuang and Dali Wang. Springer, 2006.

SELECTED PUBLICATIONS:

1. N. Sisworahardjo, A. R. Ofoli, S. Craven, and A. Eltom, "**State-of-the-Art Laboratories for Training the Modern Power Workforce**" presented at the 2013 IEEE PES General Meeting, 21 - 25 July 2013, Vancouver, BC, Canada.
2. A. R. Ofoli, A. Khaled and B. Patel, "**A Robust Adaptive-Fuzzy Controller for Different System Applications**" presented at the IEEE Industrial Application Society (IAS) 2013 Annual Conference.
3. N. Boakye-Boateng, A. R. Ofoli, "**Real-Time Simulation of a Doubly-Fed Induction Generator Based Wind Power System on eMEGASim® Digital Simulator**" presented at the IEEE Industrial Application Society (IAS) 2013 Annual Conference.
4. A. R. Ofoli "**Ammonia Storage Feedback Control to Improve Urea Usage and NOx Efficiency with Experimental Demonstration**," IEEE Industry Applications Conference Record, Las Vegas, NV, Oct., 2012.
5. A. R. Ofoli "**Experimental Demonstration of ammonia storage and slip modeling with control for an SCR aftertreatment system**," IEEE Industry Applications Conference Record, Orlando, FL, Oct. 9-13, 2011.
6. A. Rubaai, A. R. Ofoli, "**Teaching Power Electronics Converter Experiments That Integrates Fuzzy Logic Approach**," Proceedings of the 2011 ASEE Annual Conference and Exposition, Vancouver, BC, Canada, June 26-29, 2011.
7. A. Khaled, A. R. Ofoli and M. Castro, "**An Incremental Sliding Mode Controller (ISMC) for Chattering Reduction**," IEEE Industry Applications Conference Record, Orlando, FL, Oct. 9-13, 2011.
8. A. Rubaai, M. J. Castro-Sitiriche, and A. R. Ofoli, "**DSP-Based Laboratory Implementation of Hybrid Fuzzy-PID Controller Using Genetic Optimization for High-Performance Motor Drives**". *IEEE Transaction on Industry Applications*, vol. 44, Issue 6, pp. 1977-1986, Nov.-Dec. 2008.
9. A. Rubaai, M. J. Castro-Sitiriche, and A. R. Ofoli, "**Design and Implementation of Parallel Fuzzy PID Controller for High-Performance Brushless Motor Drives: An Integrated Environment for Rapid Control Prototyping**". *IEEE Transaction on Industry Applications*, vol. 44, Issue 4, pp. 1090-1098, Jul.-Aug. 2008.
10. A. Rubaai, A. R. Ofoli, and D. Cobbinah, "**DSP-Based Real-Time Implementation of a Hybrid H_{∞} Adaptive Fuzzy Tracking Controller for Servo-Motor Drives**". *IEEE Transaction on Industry Applications*, vol. 43, Issue 2, pp. 476-484, March-April 2007.
11. A. R. Ofoli and A. Rubaai, "**Real-Time Implementation of a Fuzzy Logic Controller for Switch-Mode Power-Stage DC-DC Converters**". *IEEE Transaction on Industry Applications*, vol. 42, Issue 6, pp. 1367-1374, Nov.-Dec. 2006.
12. Ahmed Rubaai, A. R. Ofoli, L. Burge III and M. Garuba, "**Hardware implementation of an adaptive network-based fuzzy controller for DC-DC converters**". *IEEE Transaction on Industry Applications*, vol. 41, Issue 6, pp. 1557-1565, Nov.-Dec. 2005.

13. Ahmed Rubaai, and A. R. Ofoli, D. Cobbinah, and M.D. Kankam, “**Two-layer supervisory controller-based thyristor-controlled braking resistor for transient stability crisis**”. *IEEE Transaction on Industry Applications*, vol. 41, Issue 6, pp. 1539-1547, Nov.-Dec. 2005.
14. Ahmed Rubaai, and A. R. Ofoli, “**Multi-Layer Fuzzy Controller for Control of Power Networks**”. *IEEE Transaction on Industry Applications*, vol. 40, Issue 6, pp. 1521-1528, Nov.-Dec. 2004.
15. A. Rubaai, and A. R. Ofoli, “**Design and Analysis of Nonlinear Digital Controllers-Based Two-level Hierarchy for Electric Utility Industry**,” *IEEE Transaction on Industry Applications*, vol. 39, pp. 395-407, March/April 2003.

FUNDING ACHIEVEMENT

- Co-PI of the **\$2.4 million** DOE grant on Workforce Training for the Electric Power Sector (TEPS).
- Awarded **\$20,120** by TN Board of Architecture & Engineering Examiners (TBAEE) for Equipment grant to upgrade Electrical Engineering Laboratories at UTC.

PROFESSIONAL MEMBERSHIPS:

- Member, ASEE, IEEE, IAS, IES.
- Member of SAE, NSBE
- Member of Tau Beta Pi Engineering Society.

ACHIEVEMENTS

- ❑ Recipient of the 2012-2013 “*Teacher of the Year Award*” in the College of Engineering and Computer Science, April 2013.
- ❑ Recipient of the 2012-2013 “*Outstanding Faculty Teacher of the Year*” Award in the Department of Electrical Engineering, April 2013.
- ❑ Recipient of the award: “*Keep the Stars Shining Performance Award*” in 2012.
- ❑ Recipient of the 2011-2012: “*Outstanding Faculty Researcher of the Year*” in the Department of Electrical Engineering in April 2012.
- ❑ Recipient of the 2010-2011 “*Outstanding Faculty Teacher of the Year*” Award in the Department of Electrical Engineering, April 2011.
- ❑ Three patents filed in the area of automotive engine controls while at Cummins Inc.
- ❑ Recipient of the 2006 IEEE/IAS Transaction Second Prize Paper Award, September 2007.
- ❑ Recipient of the “*Outstanding Scholarly Publication in the Engineering and Physical Sciences*” Award, Howard University, April 2006.
- ❑ Recipient of the 2002 “*Excellence in Renewable Energy Research*” Award from the National Renewable Energy Lab (NREL), August 2002.

PATENTS

- ❑ **Patent Application 1800.2.44**
 - EBU 8-02-12955 (Kunzler 1844), Controlling Ammonia Slip on an Ammonia Oxidation Catalyst (AMOX).
- ❑ **Patent Application 1800.2.46**
 - EBU 8-02-12957 (Kunzler 1846), Method of Determining the Amount of Ammonia and Isocyanic Acid in an SCR Catalyst.

□ **Patent Application 1800.2.47**

- EBU 8-02-12924 (Kunzler), Tracking NH₃ Storage for Improved Control of the Selective Catalytic Reduction (SCR) Process.
- EBU 8-02-12954 (Kunzler 1841), Estimating Ammonia Storage and Ammonia Slip on an SCR Catalyst.
- EBU 8-02-12960 (Kunzler 1847), NH₃ Storage Controls for Improved Control of Transient NO_x Emissions Using a Selective Catalytic Reduction (SCR) Process.

PROFESSIONAL SERVICE:

- **Chair** for Industrial Automation and Control Committee of IEEE-IAS. Jan. 2013- Current.
- **Vice-Chair** for Industrial Automation and Control Committee of IEEE-IAS, Jan. '11 – Dec. '12.
- IEEE-IAS officer as **Committee Administrator** and **Technical Committee Paper Review Chair (TCPRC)** for Industrial Automation and Controls Committee (IACC), Current.
- **Associate Editor** for Industrial Application Society (IAS) –IEEE, 2009 – Current.
- **Reviewer** for Industrial Application Society (IAS) –IEEE, 2008 - Current.