

Peter E. Johnson

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Education:

- Ph.D., Iowa State University, Mechanical Engineering, 2003
- M.S., Iowa State University, Mechanical Engineering, 2001
- B.A., Gustavus Adolphus College, Physics, 1998

Areas of Interest:

Small wind turbine optimization, virtual reality in the classroom, virtual engineering, thermofluids optimization, complex adaptive systems, computational fluid dynamics (CFD), humanitarian engineering

Recent Teaching Activities:

Aug. 2009 ó present Associate Professor at Valparaiso University

Aug. 2003 ó Aug. 2009 Assistant Professor at Valparaiso University

Highlights:

- Developing a wind turbine experiment for ME 374L Heat Power Laboratory
- Advisor for a senior design team (GE 497/498, 2009-10) that designed and developed a data acquisition system for a remote wind turbine on Ometepe Island in Nicaragua. This team also traveled to the island and relocated an existing wind turbine to provide power for a family.
- Advisor for three senior design teams (GE 497/498 ó 2005-06; 2006-07; 2007-08) that designed, developed, and installed wind turbines on Ometepe Island in Nicaragua. These wind turbines were designed to provide power to two different villages (La Palma, El Corozal) and an Orphanage.
- Studying the benefits of virtual reality as a tool for visualization of three-dimensional vectors/objects in the Mechanics-Statics course GE 109 (Fall 04-present)
- Advisor for the Society of Automotive Engineers (2003-2009)

Research Experience:

Aug. 2009 ó present Associate Professor at Valparaiso University

Aug. 2003 ó Aug. 2009 Assistant Professor at Valparaiso University

Highlights:

- Studying the educational impacts of international service-learning projects in engineering
- Developing an optimization routine for small-scale wind turbines for communities in developing countries and developing the necessary experiments to obtain the fundamental data for the hardware used in the optimization routine

- Studying the effects (quantitative as well as qualitative) of VR as a 3-D visualization tool in Statics (3-D vectors/objects)

Aug. 1998 ó Dec. 2003 Research Assistant, Dept. of Mech. Eng., Iowa State University
Highlights:

- Studied the relationships and coupling functions necessary to combine multiple solution methods to compute a single physical system
- Helped to create AMoEBA, the Adaptive Modeling by Evolving Blocks Algorithm for data summary, interpolation, and analysis
- Created a CFD model of an 800 MW tangentially-fired coal furnace
- Developed a VR interface for furnace analysis
- Created data visualization tools to better analyze data in a 3-D environment
- Managed 5-10 undergraduate engineering students working with advisor
- Member of the technical committee for the Virtual Reality Applications Center (VRAC)
- Trained later graduate and undergraduate students involved in advisor's research

Peer Reviewed Archival Papers:

- P. E. Johnson, "Direct and Indirect Benefits of an International Service-Learning Design Project: Educational Effects on Project Members and Their Peers," *International Journal for Service-Learning in Engineering*, 4(1), April 2009.
- P. E. Johnson, K. M. Bryden, and D. A. Ashlock, "Using Evolutionary Data Segregation Techniques to Reduce the Computation Time Needed to Design Piping Flow Using CFD," *Smart Engineering System Design: Neural Networks, Fuzzy Logic, Evolutionary Programming, Complex Systems, and Artificial Life*, 14:433-438, 2004.
- P. E. Johnson, K. M. Bryden, and D. A. Ashlock, "Solution of a 2-D Inverse Heat Conduction Problem Using Evolutionary Data Segregation Techniques," *Smart Engineering System Design: Neural Networks, Fuzzy Logic, Evolutionary Programming, Complex Systems, and Artificial Life*, 13:315-320, 2003.
- D. A. Ashlock, K. M. Bryden, P. E. Johnson, and D. McCorkle, "Improving Data Segregation with a Graph Based Evolutionary Algorithm," *Smart Engineering System Design: Neural Networks, Fuzzy Logic, Evolutionary Programming, Complex Systems, and Artificial Life*, 12:417-422, 2002.
- P. E. Johnson, K. M. Bryden, D. A. Ashlock, and E. Vasquez, "Evolving Cooperative Partial Functions for Data Summary and Interpolation," *Smart Engineering System Design: Neural Networks, Fuzzy Logic, Evolutionary Programming, Complex Systems, and Artificial Life*, 11:405-410, 2001.

Conferences/Workshops/Presentations:

- R. Freeman, K. Leitch, and P. E. Johnson, "Improved Pedagogy for Engineering Ethics Instruction," *Proceedings of the 2007 American Society for Engineering Education Annual Conference and Exposition*, 13p, June 2007.

- P. E. Johnson, K. Sevenser, P. D. Tougaw, and J. D. Will, "Balancing Learning Objectives and Success in a Multidisciplinary Senior Design Project," *Proceedings of the 2007 American Society for Engineering Education Annual Conference and Exposition*, 8p, June 2007.
- M. Hagenberger, P. E. Johnson, P. D. Tougaw, J. D. Will, M. Budnik, and K. Sevenser, "Managing Senior Projects: Educating Graduates and Undergraduates in a Senior Project Course," *Proceedings of the 2007 American Society for Engineering Education Annual Conference and Exposition*, 9p, June 2007.
- P. E. Johnson, M. Budnik, K. Sevenser, J. D. Will, "Motivation, Inspiration, and Economics of an International Service Project," *Proceedings of the 2007 National Capstone Design Course Conference*, June 13-15, 2007.
- M. Hagenberger, P. E. Johnson, and J. D. Will, "Understanding the Costs and Benefits of Using 3D Visualization Hardware in an Undergraduate Mechanics-Statics Course," *2006 Frontiers in Education Conference*, October 28-31, 2006.
- P. E. Johnson, "Citizenship and Service in Education," *2006 Summer Institute on Teaching Excellence presented by Purdue University Calumet Center for Instructional Excellence*, June 1-2, 2006.
- M. Hagenberger, P. E. Johnson, and J. D. Will, "Virtual Engineering Education – The Next Step in Bringing Technology to the Classroom," *2006 IL/IN American Society for Engineering Education*, March 31-April 1, 2006.
- P. E. Johnson, J. D. Will, and C. Graunke, "Virtual Reality for 3D Visualization in a Statics Course," *2005 American Society for Engineering Education Annual Conference and Exposition*, pp. 15715-15724, June 2005.
- P. E. Johnson, K. M. Bryden and D. A. Ashlock, "Solution of an Inverse Heat Conduction Problem Using Evolutionary Data Segregation Techniques," *American Society of Mechanical Engineers, Computer and Information in Engineering Division (Publication) CED*, 8:75-80, November 2003.
- P. E. Johnson and K. M. Bryden, "Virtual Reality and Energy Systems," Biomass Interest Group (BIG) Meeting, Brigham Young University, Provo, UT, March 2002.
- K. M. Bryden, G. Huang, P. E. Johnson, and E. Vasquez, "VR-XPR: A Toolkit for Rapid Development of Virtual Energy Systems," In the *Proceedings of the 27th International Conference on Coal Utilization and Fuel Systems*, Clearwater, FL, 2002.
- K. M. Bryden, P. E. Johnson, and E. Vasquez, "An Interactive Virtual Environment for Examining Furnace Performance," In the *Proceedings of the 26th International*

Conference on Coal Utilization and Fuel Systems, Clearwater, FL, pp. 869-878, March 2001.

K. M. Bryden and P. E. Johnson, "Virtual Pilot Plants: What is the Goal and What Technology Development is Needed?", In the *37th Annual Report of the Electric Power Research Center/Power Affiliate Research Program*, April 2000.

P. E. Johnson and K. M. Bryden, "Computational Modeling and 3-D Visualization of a Coal-Fired Furnace", In the *36th Annual Report of the Electric Power Research Center/Power Affiliate Research Program*, pp. 101-110, April 1999.

Social/Humanitarian Activities:

- Senior design advisor for a team that traveled to Ometepe Island, Nicaragua, re-installed a wind generator for a family, repaired a solar collector system and a wind turbine systems for an orphanage, and donated a solar panel to an community, May, 2010.
- Senior design advisor for a team that traveled to El Corozal, Nicaragua to install a wind generator for a school, March, 2008.
- Senior design advisor for a team that traveled to Los Angeles, Nicaragua to install a wind generator at the CICRIN Orphanage, March, 2007.
- Senior design advisor and faculty chaperone for a team that traveled to La Palma, Nicaragua to install a wind generator for a hospital, March, 2006.
- Faculty chaperone for a Valparaiso University Engineers Without Borders trip to Turkana, Kenya, May, 2005.
- Faculty chaperone for a Valparaiso University Habitat for Humanity trip to Johns Island, South Carolina, March, 2005.

Professional Societies:

- American Society for Engineering Education (ASEE)
- American Society of Mechanical Engineers (ASME)
- Society of Automotive Engineers (SAE)
- Engineers Without Borders