

Jennifer Guinevere Vining

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Objective Employment in Electromechanical Energy Conversion for Renewable Energy

Education

PhD, Electrical Engineering, May 2009

Minor: Mechanical Engineering

University of Wisconsin at Madison Overall GPA: 4.00/4.00

Master of Science, Electrical Engineering, January 2007

Power and Electric Machines

Thesis: *Ocean Wave Energy Converters: Overview, Legal and Economic Aspects, and Direct-Drive Power Take-Off*

University of Wisconsin at Madison Overall GPA: 3.95/4.00

Bachelor of Science, Electrical Engineering, December 2004

University of Texas at Austin Overall GPA: 3.94/4.00

Experience

6/2007 - 8/2007: OCEAN POWER TECHNOLOGIES, LTD. OF WARWICK, UNITED KINGDOM

Worked closely with a team of engineers to prepare the next generation PowerBuoy for installation with the development of (1) a wireless communication system for the PowerBuoys that meets specified EU and regional guidelines, (2) a wave climate monitoring system – including device selection, deployment, maintenance, and data collection, (3) a power take-off simulation to aid in calibrating Orcaflex for Lloyd's certification, and (4) a complete shore station equipment list with recommended differences between US and European installations.

Modeling:

Set up an external function in Orcaflex using C++ for use in simulating power take-off

Specifications:

Wrote technical specifications for installation locations and electrical equipment in maritime conditions

Sourcing from suppliers:

- Contacted suppliers for competitive quotes on goods and services
- Raised purchase orders with suppliers who met desired specifications, lead time, and budgeting requirements

5/04-8/05: SONAR DEVELOPMENT DIVISION, APPLIED RESEARCH LABORATORY OF AUSTIN, TX

Acoustic theory:

- Developed sonar rating tools for nontraditional signals using statistics such as signal-to-noise ratio, signal/noise variance, and kurtosis of the autocorrelation (match filter) to replace the time-bandwidth product rating technique for traditional signals
- Placed the rating techniques in a menu-driven suite of Matlab tools then translated the rating system into C, which is now used by the Navy

ADCP functionality and architecture:

- Developed a method to sample Acoustic Doppler Current Profiler (ADCP) output using high speed A/D converters (LabVIEW-controlled DAQs and Tektronix scopes) connected to piezoelectric transducers; Used the sampled data to reconstruct the ADCP signal pattern

- Built mathematical models of doppler velocity logging (DVL) using phase shift analysis associated with ADCP theory
- Compared theoretical accuracy of DVL to that of differential GPS

5/04 – 8/04: CO-OP IN THE VERIFICATION AND TOOLS GROUP, IBM OF AUSTIN, TX

- Automated statistical graphs and charts of user activity currently displayed on IBM's intranet
- Added Cadence's ncsim VHDL & Verilog compile functionality to two of IBM's circuit developer tools (both tools were written in Perl)
- Tested for ncsim user issues and added this information to the developer tools' documentation before releasing the new version. Found bugs in ncsim during testing which I reported to Cadence.

1/03 – 8/03: CO-OP IN THE VERIFICATION AND TOOLS GROUP, IBM OF AUSTIN, TX

- Utilized Java, Perl, VHDL, HTML, XML, and formal/semi-formal verification techniques
- Wrote Perl scripts to run varying numbers of VHDL programs through simulation and synthesis and automated the process of certifying logical equivalency between those results
- Helped test and debug the VHDL simulation and synthesis tools
- Created Java and Perl programs to automatically build websites displaying test results and statistics
- Designed and implemented a Java program that creates a Boolean equivalence checker output file

UW Research, advisor Dr. Giri Venkataramanan

8/05 – Present

Topic: Direct-Drive Ocean Wave Energy Conversion

Linear generator design for direct-drive power take-off in a "point absorber" with the aim of maximizing shear force while minimizing cost, size, and cogging forces

UT Senior Design Project, sponsored by Applied Research Laboratories 8/04 – 12/04

Topic: Real-Time Differential GPS

- Developed real-time DGPS system for highly accurate position and attitude measurements: obtained millimeter position precision and one-hundredth of a degree attitude precision
- Made this real-time information available via TCP/IP connection to other programs on the network
- Communicated between the base GPS receiver and the mobile units using wireless networking

Skills

Power Systems and Electronic Machines:

- Power/load flow and fault analysis
- DC and AC (synchronous and induction) motor operation and control
- Modeling of machine dynamics and control in PSCAD, Simulink, and Matlab
- Design of power electronic circuits and their control systems to achieve inversion, rectification, protection, and VAR support
- Layout of power electronic devices such as single- and three-phase inverters, converters, and control systems using solid state devices
- Multi-physics finite element analysis (FEA) modeling of electric machines (i.e. electrical heat, magnetic force, etc.) using ANSYS and JMAG

Mechanical Systems:

- Design and analysis of multi degree-of-freedom systems for specified motion with dynamic/time-varying system qualities
- Control schemes for moving systems
- Computation of mechanical vibration based on tensile, torsional, and longitudinal material strength in conjunction with periodic, impulse, dynamic, or static loads

Software:

- Skilled debugger and problem solver
- Programming experience in LabVIEW, Java, Perl, HTML, Mathcad, and assembly language with extensive experience in C/C++ and Matlab/Simulink
- Familiar with XML, CVS, and the PostgreSQL database for data storage

Computer Hardware:

- Practical experience programming DSP and microcontroller interfaces

- Fluency in computer, DSP, and microcontroller architecture component functionality
- Capable of creating clocked digital design with Pspice, Hspice, and Cadence
- VHDL simulation and synthesis

Operating Systems:

- Excellent comprehension of the Microsoft OS and UNIX
- Proficient in Microsoft Office, the Lotus Suite, emacs, nedit, ksh, and tesh

Teamwork: can work and brainstorm well with others

Publications

- 1) J.G. Vining, A. Muetze, “Economic Factors and Incentives for Ocean Wave Energy Conversion,” IEEE IAS Conference, Sept. 2006.
- 2) J.G. Vining, A. Muetze, “Governmental Regulation of Ocean Wave Energy Converter Installations,” IEEE IAS Conference, Sept. 2006.
- 3) A. Muetze, J.G. Vining, “Ocean Wave Energy Conversion – A Survey,” IEEE IAS Conference, Oct. 2006.

Accomplishments

Recipient, Grainger Power Engineering Scholarship ('07)
 Recipient, Claude & Dora Richardson Fellowship (fall '05)
 Recipient, COE Distinguished Fellowship (fall '06)
 Member, Eta Kappa Nu Electrical Engineering Honors Fraternity
 Member and Volunteer, Alpha Phi Omega Service Fraternity
 Best paper and project for Neural Networks: Human Voice Recognition (spring '04)
 Best paper for Engineering Economics: Economics of Wind Farms (spring '04)
 Recipient, Engineering Foundation Undergraduate Endowed Presidential Scholarship ('01-'02)
 Recipient, Thomas Holman, Jr. Endowed Presidential Scholarship in Engineering ('03-'04)
 Dean's Honor Roll, University of Texas at Austin's College of Engineering
 Member, IEEE Student Chapter