



Exponent[®]
Engineering & Scientific Consulting

Shaun Cruz, Ph.D.

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Professional Profile

Dr. Cruz is an expert in electrical engineering with extensive experience in power and energy systems, data analytics, engineering management, and research and development. At Exponent, he utilizes his expertise to provide clients with a variety of technical services, including failure analysis, product development, technical litigation support, and technical forensics.

Dr. Cruz is fluent in model-based design and systems engineering, including developing models for addressing engineering integration considerations such as system architecture restrictions, performance requirements, steady-state/dynamic/transient stability, load and usage expectations, fault tolerance, and reliability/redundancy. He is experienced in a range of industry Unified Modeling Language (UML) and Systems Modeling Language (SysML) capable tools, including MATLAB, Simulink, and CAMEO MagicDraw.

Prior to joining Exponent, Dr. Cruz worked as a research and development engineer and project manager at the Naval Surface Warfare Center Philadelphia Division. He led the prototype development of robust and autonomous power and energy systems to service unmanned Navy assets. He additionally supported various research endeavors in advanced power system stability and control, modeling and simulation of novel shipboard power systems/components, and test and evaluation of Navy systems.

Dr. Cruz received his Ph.D in Electrical Engineering at Drexel University. His research focused on the increased integration of DC power systems into AC power grids due to installations of modern technologies (e.g. renewables, energy storage, etc.), and the impact into existing power system analysis and operation tools. Specifically, he identified the convergence shortcomings of state estimators which use iterative numerical solvers and sequential approaches when applied to AC/DC power systems and developed a new holomorphic embedded state estimator to overcome these issues.

Academic Credentials & Professional Honors

Ph.D., Electrical Engineering, Drexel University, 2022

B.S., Electrical Engineering, Drexel University, 2014

M.S., Electrical Engineering, Drexel University, 2014

Science, Mathematics, and Research for Transformation Scholarship Recipient

Licenses and Certifications

Professional Engineer, New York, #109329

Google Data Analytics Professional Certificate

IBM - Introduction to Data Science

IBM Data Science Professional Certificate

Prior Experience

Research and Development Engineer, Naval Surface Warfare Center Philadelphia Division, 2014-2022

Computer Science Teaching Assistant, Drexel University, 2011

Electrical Engineering Co-op, Ametek Aerospace and Defense, 2010-2011

Professional Affiliations

Institute of Electrical and Electronics Engineers (IEEE) – Senior Member

IEEE Power and Energy Society – Senior Member

IEEE Young Professionals - Senior Member

Publications

R. Cuzner, S. Cruz, F. Ferrese and R. Hosseini, "Power converter metamodeling approach for the smart ship design environment," 2017 IEEE Electric Ship Technologies Symposium (ESTS), 2017, pp. 118-125

Q. Dong, S. Biswas, S. Cruz, A. Curlett, and T. Hannon, "Modeling and Stability Analysis of a MVDC System in the dq-Reference Frame," Intelligent Ships Symposium (ISS) X, 2015, pp. 57

Presentations

"Modeling and Stability Analysis of a MVDC System in the dq-Reference Frame," Intelligent Ships Symposium (ISS) X, May 20-21 2015

Project Experience

Software and Computer Engineering

- Analyzed test data to identify software issues in C++/Python code and identify hardware fault reasons using time series analysis
- Developed tool which mapped developed functionality to system requirement to estimate project completion and identify lagging developments
- Developed SysML model of prototype power system for interface and integration assessment.

Power and Energy

- Developed concept model of AC/DC power converter to identify system integration issues
- Developed communication network model to identify to identify signal latency issues on power system stability
- Performed analysis of variation in calculation of energy storage requirements (recharge rate, capacity, output power, run time) based on architectural decisions and load
- Verified and validated models/tools developed for optimal microgrid development and deployment
- Developed thermal model as overlay to power system model to identify potentials for thermal efficiency optimization
- Generated Plan of Action and Milestones (POAM) for development of high-power hardware in the loop testing

Technical Forensics

- Root cause analysis of electrical fault involving undersea cabling
- Root cause analysis of system failure involving wireless energy transfer