Exponent®
Engineering & Scientific Consulting

Shaun Cruz, Ph.D., P.E., PMP

Senior Managing Engineer | Electrical Engineering and Computer Science
New York
+1-212-895-8116 | scruz@exponent.com

Professional Profile

Dr. Cruz is an electrical engineer with extensive experience in power and energy systems, control systems, data analytics, engineering management, and research and development. He specializes in the assessment and development of military technology, software products and platforms, and power and energy systems and components. At Exponent, he utilizes his expertise to provide clients with a variety of technical services, including technical litigation support for legal activities relating to patent infringement, patent validity, copyright, trade secret, ITC Section 337, class-action, and product liability issues; failure and accident analysis; military and commercial product development; power system modeling and simulation; and technical enablement.

Dr. Cruz has expertise in the conceptualization, development, test and evaluation, and maturation of innovative products, including identifying candidate minimum viable products (MVPs) and identifying development strategies to address technical gaps for maturation. Dr. Cruz can advise on development of products of different sizes and maturity levels, varying from implementation of novel algorithms to integration and orchestration of various technologically mature products into existing systems and frameworks. Additionally, Dr. Cruz is well-versed in the systems engineering process and project management approaches (e.g., Agile and Waterfall). This is enabled by his military research and development background, where he developed a variety of products leveraging his electrical engineering and expertise and software knowledge in C++, Java, Python, and MATLAB.

Dr. Cruz is also 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. To overcome these issues, Dr. Cruz developed a new approach to non-linear regression using holomorphic embedding for state estimation of AC-DC power systems.

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, California, #E 26124

Professional Engineer, New York, #109329

Certified Electrical Safety Technician (CEST)

Google Data Analytics Professional Certificate

IBM - Introduction to Data Science

IBM Data Science Professional Certificate

Project Management Professional (PMP)

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

Legal Matters and Intellectual Property

- Patent Validity investigation of tire pressure sensor systems
- Patent Infringement analysis of mobile applications involving push-notifications
- Patent Infringement analysis of VoIP and radio communications systems
- Patent Infringement analysis of software tool for aid in external fixator adjustment for orthopedic bone alignment and correction
- Patent Infringement analysis of LiDAR based system for facial measurements
- ITC Patent Non-Infringement analysis of radio frequency microneedling device
- Copyright analysis of enterprise software suite used for mainframe interoperability
- Technical analysis of vehicle battery system for class action suit.
- Technical analysis of VoIP network for indemnification dispute.
- Technical analysis of software development for CAD product for contract dispute
- Technical analysis of a decentralized wireless cloud services network and blockchain system for contract dispute
- Technical analysis of capacitive touch sensors for patent dispute
- Technical analysis of fall-detection sensor algorithm for accident dispute
- Technical analysis of safety precautions enforced for electrocution dispute
- Technical analysis of generator facility design for failure and damage dispute
- Technical analysis of scene damage and hoverboard product liability for fire investigation
- Technical analysis of scene damage and USB hub product liability for fire investigation
- Technical analysis of GPS sensor system for false claims dispute

Power and Energy

- Performed electric and magnetic field modeling for various windfarm developments for permitting.
- Performed analysis of diesel engine software identify gaps in auxiliary emissions strategy reports.
- Performed power flow analysis to identify potential issues if transformer tap and operating bus voltage were modified for generating plant.
- 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

Military

- Performed analysis on technical feasibility of developing hybrid and all-electric military vehicles.
- Reviewed and developed Model Based Systems Engineering models in CAMEO for data modeling for the development of a military vehicle.
- Identified cybersecurity guidance and issues for utilization of wearables technology leveraging military networks.

Technical Forensics

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