Rajarshi Roychowdhury (Raj)

T&D Adv. Studies and R&D · Power Systems SME

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Performance Profile/Performance Summary

- Leading international expert on power system dynamics, control, stability, transients, reliability, generation interconnection, and facility addition studies for the bulk power system with close to 10 years of industry experience. Filed multiple patents in the United States, Germany, and China, demonstrating a strong ability to innovate and protect intellectual property across international jurisdictions.

- Deep understanding of emerging trends and technologies in power system dynamics, including renewable energy integration, grid modernization, and smart grid solutions, enabling the development of cutting-edge strategies and solutions.

- Demonstrated expertise in designing and implementing robust control strategies for power system stability enhancement, mitigating the risks associated with disturbances, and maintaining grid resilience.

- Demonstrated history of working with cross-disciplinary research teams and external stakeholders. Strong collaboration skills, having successfully collaborated with cross-functional teams, industry partners, and regulatory bodies to drive standardization and best practices in power system dynamics control and analysis.

- Proven background leading teams in stressful, deadline-oriented environments under budget and time constraints through the entire project lifecycle - project conceptualization, work planning, and project execution. Skilled in troubleshooting and solving a wide variety of R&D issues issues while working on challenging assignments.

Technical Skills

Power System Simulation & Design	PSS/E, TARA, PSCAD, PSLF, Powerworld, CYME, OpenDSS
Scientific Programming	Python, MATLAB, **R**, LaTeX

Education

University of Pennsylvania *Philadelphia, PA United States*

M.S. in Electrical Engineering *May 2018*

Professional Experience (Selected)

The AES Corporation - AES Ohio *Dayton, OH, United States*

Sr. Engineer T&D Adv Studies and R&D *May 2020 - Current*

- Led all power system advanced studies including power flow analysis, dynamics, transients, technical analysis of disturbances, implementation of regulatory reliability standards, and coordination of reliability and economic studies with the Regional Transmission Operator for AES Utilities in both Ohio and Indiana.
- Demonstrated expertise in developing and implementing advanced modeling techniques, such as dynamic models for synchronous generators, battery energy storage, FACTS devices, and renewable energy sources, enhancing the accuracy and reliability of the bulk power system. Provided subject matter expertise to dynamic model building activities in various stakeholder working groups including WECC Model Validation Subcommittee(MVS)
- Spearheaded and directed all Department of Energy (DoE) and other related research and development (R&D) initiatives for AES US Utilities, overseeing a portfolio of innovative projects aimed at advancing the energy sector.
- Provided strategic guidance and technical expertise to project teams, facilitating the identification of innovative solutions, overcoming technical challenges, and maximizing project outcomes.
- Directed the work of consultants/partners related to transmission planning assessments. Facilitated the interconnection process of new delivery points for AES customers leading to multiple economic development projects in the Miami Valley region, Dayton OH, and in the greater Indianapolis region, IN
- Led the interconnection studies for generation and transmission requests, including providing technical expertise to modeling and transmission assessments. Led and provided key technical direction to large projects with critical business impact.

Ford Motor Company *Dearborn, MI, United States*

Research Engineer, Advanced Electrical System Architecture *Dec 2018 - June 2020*

- Accelerated Ford's future electrical architecture overall system design; functional architecture development; feature partitioning; and system-level interactions with power, control, networking, and electric distribution systems for iconic global nameplates - Mustang and F-150.
- Delivered subject matter expertise in high-voltage and low voltage electrical system design, including power net design, power distribution unit, wiring, and Electric Vehicle system architecture design.
- Directed and optimized the advanced EDS (Electrical Distribution System) assessment for the next-gen mild hybrids with Ford Europe, interfacing with multiple internal teams and outside suppliers. Played a key role in developing trade-off studies that improved operational efficiency and reduced EDS cost by approximately **10%** percent, equating to over a million dollars in savings.
- Influenced cutting-edge research with external stakeholders in controls and robotics for Ford's next-gen manufacturing concept.
- Guided a three million dollar Department of Energy (DoE) project to develop a secure and reliable Electric vehicle fast-charging station architecture and deployment.

The Navy Yard, Philadelphia *Philadelphia, United States*

Systems Engineer *May 2017 - Aug. 2017*

- Developed the design and engineering, project scope, technical oversight, and interconnection requirements for construction of a building-scale microgrid in the Philadelphia Navy Yard.
- Managed and provided technical expertise to a range of equipment implementations of distribution and communication technologies, including the installation and configuration of the microgrid controllers.
- Developed the curriculum and the associated instructor guides, provided subject matter expertise, and project management for the Energy Storage and Microgrid Training and Certification (ESAMTAC) program; the only national Energy Storage and Microgrid safety training program certified by the National Electrical Contractor's Association (NECA).

Indian Institute of Engineering Science & Technology *India*

Senior Research Fellow & Project Fellow *Aug. 2011 - July 2013*

- Developed and improved guided avionics algorithms in the areas of guidance, navigation, controls, estimation, and target tracking.
- Led the team through initial conceptual development, developed performance specifications, process requirements, layout complexity, managed overall cost and lead-time limits.
- Supported design reviews, analyses, simulations, and component/system testing to ensure delivery of products that exceeded customer requirements and expectations.
- Led the team in multiple design and code reviews; submitted classified reports to the funding agency detailing our findings and recommendations.
- Supported compliance audits conducted by internal and external agencies, participated and led stakeholder conversations, and also managed group workflows to meet cost and schedules.

Selected Publications

Stepping Up to the Future With Power Xfmrs: Asset Mgmt. Strategies: State of the Art and Recommendations for the Future
Rajarshi Roychowdhury, Xuan Wu, Michael Russ, Dennis Fleming, Joshua Spalding
IEEE Power and Energy Magazine 21.2 (2023) pp. 40–50. IEEE

Effect of Endogenous Failure Events on the Survivability of Turboelectric Distributed Propulsion System
Balaji Guddanti, Jongchan Choi, Mahesh S Illindala, Rajarshi Roychowdhury
IEEE Transactions on Industry Applications 58 (1 2022) pp. 224–232

Resiliency-Based Planning for Interconnected Lunar Microgrids using Hybrid-Edge Rewiring
Balaji Guddanti, Rajarshi Roychowdhury, Mahesh S Illindala
2022 IEEE/IAS 58th Industrial and Commercial Power Systems Technical Conference (ICPS) (2022) pp. 1–5

Substation Topology and Line Switching Control Using Deep Reinforcement Learning
Rajarshi Roychowdhury, John B Ocampo, Balaji Guddanti, Mahesh S Illindala
2022 IEEE/IAS 58th Industrial and Commercial Power Systems Technical Conference (ICPS) (2022) pp. 1–6

Sensitivity Analysis Based Identification of Key Parameters in the Dynamic Model of a Utility-Scale Solar PV Plant
Balaji Guddanti, Ramirez Jorge Orrego, Rajarshi Roychowdhury, Mahesh S. Illindala
IEEE Transactions on Power Systems 8950 (c 2021) pp. 1–11

Analysis of Distributed Energy Aggregations based on Cyber-Physical-Social Systems Modeling
John B Ocampo, Rajarshi Roychowdhury, Balaji Guddanti, Mahesh S Illindala, Akundy Vyas Anirudh
2021 IEEE International Conference on Power, Electrical, Electronic and Industrial Applications (PEEIACON) (2021) pp. 71–74

Autonomous voltage regulation by distributed PV inverters with minimal inter-node interference
Sree Subiksha M Reshikeshan, Sarah L Matthiesen, Mahesh S Illindala, Ajit A Renjit, Rajarshi Roychowdhury
IEEE Transactions on Industry Applications 57.3 (2021) pp. 2058–2066. IEEE

Synergistic Activities

2021	**Senior Member**, IEEE, IEEE-PES, IEEE-IAS, IEEE Smart Grid Society	*United States*
2021	**Reviewer**, All IEEE-PES, & IEEE-IAS Transactions Journals	*United States*
2021	**Professional Member**, IEEE-HKN, Board of Governors	*United States*
2021	**Secretary**, IEEE-PES, Columbus Section	*United States*
2020	**MIE & Chartered Engineer**, The Institute of Engineers (IEI), India	*India*
2015	**Member**, The International Association of Engineers (IAENG)	*Hong Kong*

Honors & Awards

2021	**Outstanding Young Engineer Award**, IEEE PES Columbus Section	*Columbus, U.S.A*
2023	**Outstanding Reviewer Award**, IEEE Transactions on Power Delivery	