Krishna Sandeep Ayyagari

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https://scholar.google.com/citations?hl=en&user=J1EMGf4AAAAJ

Education

The University of Texas at San Antonio San Antonio, TX
Ph.D. in Electrical Engineering *Aug. 2018–Present*

- Cumulative GPA: 4.0/4.0
- Thesis: Optimization and Control of Multi-Energy Systems
- Advisor: Dr. Nikolaos Gatsis

The University of Texas at San Antonio San Antonio, TX
Master of Science in Electrical Engineering *Aug. 2016 –Aug. 2018*

- Cumulative GPA: 4.0/4.0
- Thesis: Chance Constrained Voltage Regulation via Affine Inverter Control Policies in Distribution Networks
- Advisor: Dr. Nikolaos Gatsis

Jawaharlal Nehru Technological University Kakinada, India
Bachelor of Technology in Electrical Engineering *Aug. 2006 – May. 2010*

- Cumulative GPA: 8.0/10
- Project: Voltage Control of Distribution Network using STATCOM

Research Experience

Research Assistant Jan. 2017 – present
The University of Texas at San Antonio *San Antonio, TX*

Chance Constrained Voltage Regulation via Affine Inverter Control Policies in Distribution Networks

- Reactive power control of PV inverters in distribution networks considering uncertainty in user load demand and solar pv generation
- Develop affine policies utilizing stochastic optimization to control PV inverters in centralized, decentralized, and distributed manner

Voltage Regulation in Buildings to Distribution Network Integration utilizing DERs Reactive Power Flexibility

- Develop a framework which couples commercial and residential buildings, PV generators, and battery energy storage systems to the power distribution network
- Simultaneously optimize buildings and grid while satisfying both grid and building constraints

Data Driven Voltage Regulation in Distribution Networks using Artificial Neural Networks

- Develop data driven stochastic optimization framework to generate optimal PV reactive power setpoints
- Implement artificial neural networks to predict the optimal PV setpoints in decentralized fashion for voltage regulation

Co-Optimization of Interdependent Water and Power Distribution Networks

- Develop novel framework to integrate water and power distribution networks utilizing monomial approximations for water hydraulics and LinDist flow in power distribution networks for optimal voltage regulation
- Develop novel optimization algorithm to include pump efficiency in the optimization, all while using convex optimization techniques
- Develop a novel framework to optimally manage pump-as-turbines and pressure reducing valves in water distribution networks to facilitate energy production in water-to-power distribution networks
- Develop a novel framework to optimally manage Pumps in water distribution networks integrated with multi-phase power distribution networks to facilitate energy production

Course Projects

- Temperature-based building load prediction using multiple linear regression

Publications

Journals

- Fontenot, Hannah, Ayyagari, Krishna Sandeep, Dong, Bing, Gatsis, Nikolaos, Taha, Ahmad, "Buildings-to-Distribution-Network Integration for Coordinated Voltage Regulation and Building Energy Management via Distributed Resource Flexibility", in Sustainable Cities and Society, Mar. 2021
- Ayyagari, Krishna Sandeep, Gonzalez, Reynaldo, Jin, Yufang, Alamaniotis, Miltiadis, Ahmed, Sara, Gatsis, Nikolaos, "Data Driven Decentralized Voltage Regulation in Distribution Networks using Artificial Neural Networks" (in preparation)
- Ayyagari, Krishna Sandeep; Shen Wang; Nikolaos Gatsis; Ahamad F. Taha; Marcio Giaomoni, "Coupling of Interdependent Electric and Water Distribution Systems: A Successive Linear Approximation-Based Approach" (in preparation)
- Ayyagari, Krishna Sandeep; Nikolaos Gatsis; Ahamad F. Taha; Dong, Bing, "Chance Constrained Voltage Regulation via Affine Inverter Control Policies" (in preparation)
- Ayyagari, Krishna Sandeep; Nikolaos Gatsis, "Optimal Pump Scheduling in Multi-Phase Distribution Networks: A Bender Decomposition Approach" (submitted to Electric Power Systems Research, PSCC, 2022)

Conferences

- K. S. Ayyagari, N. Gatsis and A. F. Taha, "Chance Constrained Optimization of Distributed Energy Resources via Affine Policies," 2017 IEEE Global Conference on Signal and Information Processing (GlobalSIP), Montreal, QC, 2017, pp. 1050-1054
- K. S. Ayyagari, N. Gatsis, A. F. Taha and B. Dong, "On Static and Adaptive Policies for Chance-Constrained Voltage Regulation," 2018 52nd Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, 2018, pp. 1858-1862
- K. S. Ayyagari, R. Gonzalez, Y. Jin, M. Alamaniotis, S. Ahmed and N. Gatsis, "Artificial Neural Network-Based Adaptive Voltage Regulation in Distribution Systems using Data-Driven Stochastic Optimization," 2019 IEEE Energy Conversion Congress and Exposition (ECCE), Baltimore, MD, USA, 2019, pp. 5840-5847
- Fontenot, Hannah, Ayyagari, Krishna Sandeep, Dong, Bing, Gatsis, Nikolaos, Taha, Ahmad "Buildings-to-Distribution Network Integration to Enable Voltage Regulation Considering Renewable Energy Resources", 2020 Building Performance Analysis Conference and SimBuild, Chicago, IL, USA, 2020
- Ayyagari, Krishna Sandeep, Shen Wang Nikolaos Gatsis, Ahamad F. Taha, Marcio Giaomoni,"Co-Optimization of Interdependent Power and Water Distribution Networks", 2021 Innovative Smart Grid Conference, North America, Apr.2021
- Ayyagari, Krishna Sandeep, Shen Wang, Nikolaos Gatsis, Ahamad F. Taha, Marcio Giaomoni, "Energy Efficient Optimal Water Flow Considering Pump Efficiency", 2021 IEEE Power Tech, Milan, Italy, Aug. 2021

Poster Presentations

- Fontenot, Hannah, Ayyagari, Krishna Sandeep, Dong, Bing, Gatsis, Nikolaos, Taha, Ahmad, "Buildings-to-Distribution-Network Integration Framework including Photovoltaics and Battery Energy Storage System," presented at the Intelligent Building Operations Workshop, Boulder, CO, Aug. 2019
- K. S. Ayyagari, N. Gatsis, and A. F. Taha, "A Family of Policies for Reactive Power Control of PV Inverters in Distribution Networks," presented at the DistribuTECH Conference and Exposition, San Antonio, TX, Jan. 2018

Book Chapter

- B. Koti Reddy, K. S. Ayyagari, M. Raveendra Reddy, "Electrical Safety for Rural and Residential Micro-Grids", Residential Microgrids and Rural Electrifications (RMRE), Elsevier, 2021 (In press)
- B. Koti Reddy, K. S. Ayyagari, M. Raveendra Reddy, M. Alhaider" Application of Machine Learning Techniques in Modern Hybrid Power Systems – A Case Study", River Publications, 2021 (Accepted)

Invited Talks

- B. Koti Reddy, K. S. Ayyagari, "Bridging the Gap Between Industry and Academia", BVRIT, Hyderabad, India, Jan. 2021
- B. Koti Reddy, K. S. Ayyagari, "Bridging the Gap Between Industry and Academia", Siddartha College of Engineering, Hyderabad, India, Dec. 2020
- B. Koti Reddy, K. S. Ayyagari, "Bridging the Gap Between Industry and Academia", GNITS, Hyderabad, India, Dec. 2020
- B. Koti Reddy, K. S. Ayyagari, "Voltage Regulation using Smart PV Inverters in Distribution Networks", BVRIT, Hyderabad, India, Dec. 2020
- B. Koti Reddy, K. S. Ayyagari, "Modeling and Simulation of Power Systems using ETAP", VIT, Chennai, India, Oct. 2020
- B. Koti Reddy, K. S. Ayyagari, "Research and its Importance in Modern Era", IEEE Kyambogo University student branch, Kampala Uganda, Aug. 2021
- B. Koti Reddy, K. S. Ayyagari, "Opportunities and Challenges with Smart Inverters in Renewable Rich Distribution Networks", Central Board of Irrigation and Power (CBIP), Delhi, India, Sept. 2021
- B. Koti Reddy, K. S. Ayyagari, "Machine Learning and its Applications in Smart Grids, GITAMS University, India, Sept. 2021

Teaching Experience

- Mentoring the Class CI-6623 to promote STEM education in High Schools, Aug.2021-Dec.2021
- Teaching Assistant at UTSA for EE-4811, Senior Design, Aug. 2018–Dec. 2018
- Assistant Professor, Lords Institute of Technology, Hyderabad, India, Jun. 2010–Dec. 2010

Professional Experience

National Renewable Energy Laboratory Colorado, USA

Graduate-III Research Engineer *May.2021– Aug. 2021*

- Collaborate with NREL research engineers on projects involving customer distributed energy resources
- Work with the Power Systems Design and Planning (PSDP) group in the Power Systems Engineering Center (PSEC) at NREL. PSEC supports the science and technology goals of the U.S. Department of Energy and NREL toward a sustainable energy future
- Research time spent on projects examining the planning and operational impacts of distributed energy resource technologies on the power system, analysis of utility and customer data, modeling, and optimization of distributed energy resources

Musimmas Edible Oil Refinary Nellore, India

Senior Electrical Engineer *Jan. 2011–Jun. 2016*

- Involved in power bidding with the transmission companies and purchased power to reduce the overall unit cost
- Involved with production departments to understand the standard operating procedures of the plants and their requirements during the critical time to maintain the necessary spares and improve the reliability
- Performed cost calculations and documentation to report the basic oversight profitability of the production
- Identified power system issues through field inspections and the study of maps, diagrams, and graphs
- Conducted electrical safety on arc-flash and grounding and educated the employees in the plant to attain zero electric accidents
- Developed plans, schedules, and anticipated the problems related to electrical machinery and switchgear
- Effectively communicated the problems at all levels of the organization
- Provided support to managers in the installation of electrical components by choosing the specifications as per the industry standards and tested the completed work to ensure compliance
- Assisted to utilize the ETAP software to perform plant design, electrical wiring schematics for the industrial system upgrade
- Designed PLC schematics for system relaying and protection

Awards and Scholarships

- Graduate teaching assistance program (GTAP), UTSA, Aug. 2018–Aug. 2021
- Graduate student scholarship, UTSA, Aug. 2017
- Open cloud institute fellowship (OCI), UTSA, May. 2017

Certifications

- OP-101: Fundamentals of Real-Time Simulation with RT-LAB, Dec. 2020
- E.I.T, Texas, Aug. 2018, https://account.ncees.org/rn/1729534-1037700-ad8bc99

Skills

- Matlab
- Simulink
- MatPower
- OpenDSS
- PowerWorld
- ETAP
- EPANET
- Phyton, (Intermediate)
- Julia, (Beginner)
- Homer, (Beginner)
- Gurobi
- CVX
- YALMIP
- LATEX

Professional Affiliations

- IEEE, Student Member
- IEEE Power and Energy, Student Member

Peer Review Service

- Reviewer, IEEE Transactions on Smart Grid
- Reviewer, Sustainable Cities and Society, Elsevier