ATINUKE ADEMOLA-IDOWU

CONTACT INFORMATION

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EDUCATION

University of Washington - Seattle Sept. 2015 - June 2020
Ph.D., Electrical and Computer Engineering
Advisor: Prof. Baosen Zhang
Thesis Title: Data-Driven Optimal Frequency Control in Low-Inertia Power Systems.

Stanford University Sept. 2013 - June 2015
M.S., Electrical Engineering

Covenant University, Nigeria Oct. 2005 - July 2010
B.Eng, Electrical and Electronics Engineering (First Class Honors)

TECHNICAL SKILLS

Background: Mathematical Modeling, Control Theory (MPC, LQR, LQG, PID), Numerical Optimization (Linear, Nonlinear, Integer, Stochastic), Power Systems, Power Electronics, Machine Learning (Supervised, Unsupervised, Reinforcement Learning)
Programming Languages: Python, MATLAB, C++, Java, SQL, GAMS, AMPL, Gurobi
Softwares and Frameworks: TensorFlow, Keras, Simulink, CVX, OpenDSS, GridLab-D, Plecs.

RESEARCH EXPERIENCE

Inverter-Based Resource Placement to Improve Controllability in Power Network
Supervisor: Prof. Baosen Zhang Sept 2019 -
- Proposed an algorithm to determine the optimal placement of multiple renewable energy resources (control inputs) to guarantee network controllability in the event of a disturbance to the network. Controllability conditions are analyzed under scenarios of large disturbances, varying noise levels, delayed measurements and limited communication.

Power Flow Computation using Machine Learning
Supervisor: Prof. Baosen Zhang Sept 2018 -
- Applied machine learning algorithms to determine the solution to a highly nonlinear power flow equation typically solved through iterative Newton-Raphson methods.

Frequency Control and Stability in Low-Inertia Power Systems
Supervisor: Prof. Baosen Zhang Sept 2017 - Aug 2019
- Proposed a new control strategy based on model predictive control and a modified swing equation based model to determine the active-power set-point for inverter-based resources in a low-inertia power systems.
- The proposed algorithm explicitly takes the hard constraints in power and energy into account and incorporates an observer design model to enhance its robustness to measurement noise and limited communication.

Optimal Design Virtual Inertia and Damping Coefficients for VSM
Supervisor: Prof. Baosen Zhang March 2016 - Sept 2017
- Proposed an optimization algorithm to determine the optimal inertia and damping gain coefficients for a virtual synchronous machine (VSM) (a second-order oscillator controller) to enable inverter-based resources efficiently participate in frequency control.
- The proposed optimization algorithm was based on H-2 norm optimal control with a gradient

derived due to the non-convexity of the problem and computed using projected gradient descent

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PROFESSIONAL EXPERIENCE

Doosan GridTech — Power Systems Analytics Intern
Seattle, WA — June 2018 - Sept 2018
- Analysis of measurement data from a distribution network with energy storage and solar integrated to validate the performance and recommend improvements to the voltage support controllers of the inverters connected.

National Renewable Energy Laboratory (NREL) — Research Intern
Golden, CO — June 2017 - Aug 2017
- Robust real-time voltage control of an inverter-connected renewable energy source using active and reactive power in a power system distribution network.

IBM Research - Almaden — Research Intern
San Jose, CA — June 2015 - Sept 2015
- Battery degradation modeling and lifetime estimation.
- Battery aging experiment and data analysis.

Bloom Energy — Electrical Engineering Intern
Sunnyvale, CA — July 2014 - Sept 2014
- Three phase fault analysis on different sources and loads.
- Multilevel inverter modeling in Simulink

PUBLICATIONS

1. A. Ademola-Idowu and B. Zhang, "Frequency Stability Using Inverter Power Control in Low-Inertia Power Systems" [Submitted IEEE Transactions on Power Systems]
2. A. Ademola-Idowu and B. Zhang, "Optimal Design of Virtual Inertia and Damping Coefficients for Virtual Synchronous Machines," 2018 IEEE Power & Energy Society General Meeting (PESGM), Portland, OR, 2018, pp. 1-5. (**Nominated for Best Conference Papers on Power System Stability, Control, and Protection**)
3.A. Almaimouni, A. Ademola-Idowu, J. N. Kutz, A. Negash, and D. Kirschen, Selecting and evaluating representative days for generation expansion planning, in 2018 Power Systems Computation Conference(PSCC). IEEE, 2018, pp. 17

SELECTED PROJECTS

Data Pipeline for High Resolution Measurement Data ($\sim$ 900 GB)
Project Sponsor: Alaska Center of Power and Energy and CEI, UW — April 2019 - July 2019
- Created a package that implements a data-pipeline which takes in high resolution ($\sim$ 7 Hz) power meter data per channel in NetCDF format, down-samples to a user defined lower resolution, fills in missing data, merge data from each channel per meter into a single aggregated dataset and loads into a time series database called TimescaleDB.
- Project repository [Team Project]: https://demand-acep.readthedocs.io/en/latest/intro.html

Route Topology Visualization
Project Sponsor: King County Metro, Seattle and CEI, UW — Jan 2019 - March 2019
- Created a tool to analyze the path along any terrain and visualize the elevation changes for King County Metro bus routes using the metro's route shapefile for the route of interest and a raster file for the elevation data. - Project repository [Team Project]: https://github.com/aidowu/Route_Dynamics.

Representative Days Selection Using SVD and K-means Clustering
Project Supervisor: Prof. Nathan Kutz Jan 2016 - March 2016
- Applied singular value decomposition (SVD) and k-means clustering technique to select representative days which are a subset of days in a year with the same electricity consumption profile.

Electricity Demand Forecast using Machine Learning
- Applied machine learning algorithms to forecast the short-term electricity consumption for an aggregated residential demand profile.

AWARDS

- Clean Energy Institute/DIRECT Graduate Fellowship (Sept. 2018 - June 2019)
- Presidential Special Scholarship Award for Innovation and Development (PRESSID) (2013 - 2018)

PROFESSIONAL ENGAGEMENTS

Conference Reviewer: IEEE PES General Meeting 2018 &2019, IEEE Industrial Electronics Conference 2018

Outreach: Clean Energy Institute Ambassador

ACTIVITIES

1. *Mentor*, The Bridge Initiative - http://www.thebridgeinitiative.org
- Mentor and guide exceptional Nigerian university graduates through their application process to top US graduate programs, and provide them with the resources they need to be successful applicants.
- Provide opportunities for students in the US to connect with Nigeria for internships, jobs, development initiatives or to pursue their own entrepreneurial endeavors.
2. *Mentor*, Rising Leaders, Inc (Seattle Chapter) - https://www.risingleadersinc.org/
Empowers underserved middle school students through high-quality mentorship and leadership development training
3. *Volunteer*, Tech Bridge Girls - https://techbridgegirls.org
Inspire and empower girls to become the next generation of innovators and leaders in science, technology, engineering and math.
4. *General Secretary*, Graduate Student in Electrical Engineering (GSEE), Stanford University
5. *Industrial Liaison*, Women in Electrical Engineering (WEE), Stanford University

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RELEVANT COURSEWORK

Machine Learning	Data Science Methods for Clean Energy Research
Convex Optimization	Software Engineering for Data Scientists
Time Series	Networked Dynamics Systems
Optimal Control Theory	Online and Adaptive Methods for Machine Learning
Multivariable Control	Nonlinear Control
Power Electronics	Mathematical Foundations of System Theory
Power Systems Dynamics and Control	Computational Methods for Data Analysis
Power Systems Economics	Power Systems Analysis