

MICHAEL SANKUR

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Mechanical Engineer and Computational Scientist with experience in linear, nonlinear, and distributed control systems, applied optimization, dynamic and discrete event simulation, data science, and supervised and unsupervised machine learning.

PROFESSIONAL AND RESEARCH EXPERIENCE

HyperGiant Industries

Data Scientist

August 2021 - Present

- Produce simulation framework of electric transmission grid for development and testing of prevention and response strategies for extreme weather events, and deploy on FastAPI within Docker container
- Integrate simulation framework with Microsoft Azure to auto-update Docker image on server at rest endpoint
- Incorporate models of weather effects on generation capacity and user demand on electric transmission grid
- Develop and implement predictive optimization for reducing severity of weather effects, eliminating high line loading
- Experiment with use of temporal convolutional neural networks for anomaly detection in time series data
- Integrate simulation framework with Microsoft Azure to auto-update Docker image on server

Lawrence Berkeley National Lab

Berkeley, CA

Computational Project Scientist

March 2019 - July 2021

- Researched methods for optimization of control policies for complex and integrated systems
- Led team of three engineers in implementing two algorithms for solving power flow on distribution grids
- Contributed to integrated simulation framework with models of battery energy storage and inverters, and associated controllers
- Led team of two engineers in developing Modelica library of comprehensive extremum seeking implementations
- Researched model-free control and optimization techniques for increased integration and additional utility of distributed energy resources on electric distribution grids
- Implemented extremum seeking algorithms for real-time control of distribution grid voltage
- Developed several extensions to extremum seeking control; including batch extremum seeking, discrete action extremum seeking, and decaying probe amplitude, leading to 5 conference papers and 1 journal article

Postdoctoral Researcher

February 2018 - February 2019

- Researched model-free control and optimization methods for integration of distributed energy resources on electricity distribution grids
- Created comprehensive simulation environment for electric distribution grid modeling and simulation

- Determined conditions for stability of extremum seeking with decaying probe amplitude
- Investigated real-time control of distribution grid voltage through extremum seeking

Lawrence Berkeley National Lab and University of California, Berkeley Berkeley, CA
Graduate Student Research Assistant April 2016 - August 2017

- Created distribution network simulation environment for analysis, control, and optimal dispatch of distributed energy resources
- Developed and analyzed linear models of power flow for use in optimization programs
- Designed optimization framework for sizing and placement of energy resources
- Investigated optimal control of office scale battery storage for load-shedding.
- Designed, produced, and tested scalable small-building automation system.
- Designed and implemented optimal control algorithm of office plug-loads.

EDUCATION

Doctorate of Philosophy, Mechanical Engineering December 2017
 University of California, Berkeley Berkeley, CA

Master of Science, Mechanical Engineering May 2015
 University of California, Berkeley Berkeley, CA

Master of Science, Aerospace Engineering June 2009
 University of California, San Diego San Diego, CA

Bachelor of Science, Mechanical Engineering *cum laude* June 2008
 University of California, San Diego San Diego, CA

SELECTED PUBLICATIONS

M. D. Sankur, D. Arnold. “Extremum Seeking over a Discrete Action Space.” presented at the *2021 American Control Conference*, 2021.

M. D. Sankur, R. Dobbe, A. von Meier, E. Stewart, D. Arnold. “Optimal voltage phasor regulation for switching actions in unbalanced distribution systems.” *2020 IEEE Power & Energy Society General Meeting (PESGM)*. IEEE, 2020.

M. Sankur, M. Baudette, J. MacDonald, D. Arnold, “Batch measurement extremum seeking control of distributed energy resources to account for communication delays and information loss,” in *Proceedings of the 2020 Hawaii International Conference on System Sciences*, 2020.

M. Sankur, R. Dobbe, A. von Meier, D. Arnold, “Model-free optimal voltage phasor regulation in unbalanced distribution systems.” *IEEE Transactions on Smart Grid* 11.1 (2019): 884-894.

M. Sankur, D. Arnold, “Extremum Seeking Control of Distributed Energy Resources with Decaying Dither and Equilibrium-based Switching,” in *Proceedings of the 2019 Hawaii International Conference on System Sciences*, 2019.

Full publication list: https://scholar.google.com/citations?user=J_eybbEAAAAJ&hl=en