Han Kun Ren

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Education

University of Oxford, PhD in Engineering Science 10/2020 - Present

Thesis: Optimizing energy storage sizing, placement, and operation in renewable systems with solar and wind generation, with the objective of minimizing system costs while maximizing storage utilization.

Experience

Research Assistant, University of Oxford 5/2022 - 8/2022

- Optimized storage sizing and placement to maximize storage utilization and minimize generator costs while accounting for storage efficiency, self-discharge, energy limits, power limits, and system losses.
- The novel optimization method operates without requiring storage costs, which stands in contrast to other methods, where errors in storage cost estimates can lead to inaccuracies in storage sizing and placement.

Energy Analyst, EcoSync 5/2021 - 7/2021

- Developed and implemented physical models on heating-related energy expenditure, carbon emissions, and heat loss for a real-time room-by-room online tracking system.

Energy Analyst, Energy Systems Catapult 2/2021 - 3/2021

- Modelled electricity demand for the purpose of optimizing battery storage schedules to reduce peak demand, using machine learning techniques such as gradient boosting regression and recurrent neural networks.

Teaching Assistant, University of Oxford 1/2021 - 3/2023

- Enhanced Oxford Masters students' knowledge on energy storage and renewable energy by teaching optimal storage sizing and placement, and storage design for solar and wind energy utilization.
- Assisted professors and guest speakers in both in-person and online lecture delivery. Provided guidance to student assignments. Managed the course webpage for course material distribution and lecture recording.

Engineering and Project Management Assistant, TC Energy 5/2017 - 8/2018

- Streamlined engineering drawing process and improved drawing accuracy, saving 200 hours annually, by semi-automating the mapping of corrosion prevention devices according to placement designs using VBA.
- Enabled project managers to facilitate concurrent progression in constructions and permit applications across hundreds of sites, by creating an automated tracker that monitors permit status and construction schedules.
- Designed a unified search platform to efficiently manage the documentations for changes in project scope, schedule, and cost for corrosion prevention projects across Canada.

Skills

Software: Python, C, VBA, Microsoft Office.
Visualization: matplotlib, AutoCAD, SketchUp.
Renewable: generation model, capacity sizing.
Optimization: Gurobi, genetic algorithm, particle swarm.
Storage: capacity sizing, site placement, operation strategy.
Power System: load flow analysis, optimal power flow.

Awards and Honors

- Research paper on energy storage sizing featured in Oxford article, University of Oxford, 2023.
- Oriel DPhil Scholarship in Engineering Science, University of Oxford, 2020-2023.
- Top Energy Transition Group Project Award, University of Oxford, 2020.
- Undergraduate Research Fellowship, University of Toronto, 2016.
- Engineering Dean's Honor List, University of Toronto, 2015-2018.