

Utkarsha Agwan

Graduate Researcher in Electrical Engineering and Computer Sciences, UC Berkeley

Website | LinkedIn | Google Scholar | uagwan@berkeley.edu

Education

University of California, Berkeley

PhD, Electrical Engineering and Computer Sciences, *2018-2023 (expected)*

MS, Electrical Engineering and Computer Sciences, *2020*

Indian Institute of Technology, Delhi

Bachelor of Technology, Electrical Engineering, *2018*

Research

Mobile Storage in Power Networks

Collaborators: Prof. Junjie Qin and Prof. Kameshwar Poolla

Mobile batteries can provide valuable services to the grid. We analyze the value of mobile storage such as EVs in the power network through the economic dispatch problem, develop analytic expressions for the same, and use these to develop algorithms for optimal relocation.

Demand Response Contracts: Participation and Design

Collaborators: Prof. Kameshwar Poolla and Prof. Costas Spanos

Demand response programs can provide valuable services to electric utilities. We optimize participation of assets in such programs using stochastic modeling, and design utility contracts.

Electrifying Long Haul Truck Freight: Technology and Impacts

Collaborators: Dr. Amol Phadke and Prof. Deepak Rajagopal

Through a data driven optimization model, we estimate the technology and infrastructure investments needed to achieve widespread electrification. We analyze impacts on the electric grid and develop a prioritization model for resources. This analysis fed into the 2035 Report 2.0 by UC Berkeley.

Optimal Prosumer Aggregations: Design and Modeling

Collaborators: Prof. Costas Spanos and Prof. Kameshwar Poolla

Consumers with energy resources can benefit from mutual energy trades with their neighbours. We investigate local energy trading markets, analyze cooperation and competition among participants, and develop metrics for optimal aggregations.

Experience

Consultant in the Smart Energy and Distributed Resources space, *2018 - current*

Technical Cases:

- Advised a startup in the energy market management space on evaluating load shift and demand response potential, designing pricing and incentives and provided guidance on technical implementation

Business Development Cases:

- Advised a company working to deliver off-grid energy solutions on evaluating partnerships and potential clients, and developed a framework to analyze partners
- Advised an energy storage management company on analysing new markets and regulatory incentives, and evaluated new technology offerings to form recommendations on new project development strategies

Data Science Intern, C3 AI, May 2022 - August 2022

Developed a machine learning solution for an industry client in the logistics space. Worked on the entire data science project lifecycle: understanding the data, validating hypotheses and building a scalable solution.

Engineering Intern, Camus Energy, May 2021 - August 2021

Developed valuation metrics for DERs on distribution networks. Analyzed data availability and technical considerations, created initial mockups and defined requirements for a new product.

Service & Teaching

Graduate Student Instructor (*Fall 2022*) Optimization Models in Engineering
President (*2022-2023*) Computer Science Graduate Entrepreneurs
CTM, Climate Change AI (CCAI) (*2022-2023*) for Community Events
Graduate Student Instructor (*Spring 2021*) Non Linear Systems & Control
Summit Director (*2021*), Berkeley Energy & Resources Collaborative (BERC)
President (*2019-20*), Women in CS and Engineering at Berkeley (WiCSE)

Programming

Python | MATLAB | C++ | Java | R

Key Courses

Convex Optimization & Algorithms | Artificial Intelligence | Machine Learning
Theoretical Statistics | Applied Statistics | Microeconomics and Game Theory
Linear Systems and Control | Non Linear Systems and Control | Power Engineering

Publications

Conference Papers

- **Agwan, U.**, Qin, J., Poolla, K., & Varaiya, P. (2022). Electric Vehicle Battery Sharing Game for Mobile Energy Storage Provision in Power Networks. *To appear in 2022 61st IEEE Conference on Decision and Control (IEEE CDC 2022)*
- **Agwan, U.**, Qin, J., Poolla, K., & Varaiya, P. (2021). Marginal Value of Mobile Energy Storage in Power Network. *2021 60th IEEE Conference on Decision and Control (IEEE CDC 2021)*
- **Agwan, U.**, Spanos, C.J., & Poolla, K. (2021). Asset Participation and Aggregation in Incentive-Based Demand Response Programs. *2021 IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (IEEE SmartGridComm)*
- **Agwan, U.**, Poolla, K., & Spanos, C.J. (2021). Optimal Composition of Prosumer Aggregations. *2021 IEEE PES Innovative Smart Grid Technologies (ISGT Europe)*
- **Agwan, U.**, Spangher, L., Arnold, W., Srivastava, T., Poolla, K., & Spanos, C. J. (2021). Pricing in Prosumer Aggregations using Reinforcement Learning. *Twelfth ACM International Conference on Future Energy Systems (e-Energy 2021)*
- **Agwan, U.** (2020). Optimal Prosumer Aggregations: Design and Modeling.

Workshop Papers and Preprints

- **Agwan, U.**, Qin, J., Poolla, K., & Varaiya, P. (2022). Electric Vehicle Battery Sharing Game for Mobile Energy Storage Provision in Power Networks. arXiv preprint arXiv:2209.06461.
- Yang, Y., **Agwan, U.**, Hu, G., & Spanos, C. J. (2020). Selling Renewable Utilization Service to Consumers via Cloud Energy Storage. arXiv preprint arXiv:2012.14650. *Under Review at IEEE Transactions on Power Systems*
- Jang, D., Spangher, L., Khattar, M., **Agwan, U.**, Nadarajah, S., & Spanos, C. (2021). Offline-Online Reinforcement Learning for Energy Pricing in Office Demand Response: Lowering Energy and Data Costs. arXiv preprint arXiv:2108.06594/
- Arnold, W., Srivastava, T., Spangher, L., **Agwan, U.**, & Spanos, C. (2021). Adapting Surprise Minimizing Reinforcement Learning Techniques for Transactive Control. *Proceedings of the Twelfth ACM International Conference on Future Energy Systems*.

Publications

- Jang, D., Spangher, L., Khattar, M., **Agwan, U.**, & Spanos, C. (2021). Using Meta Reinforcement Learning to Bridge the Gap between Simulation and Experiment in Energy Demand Response. arXiv preprint arXiv:2104.14670.
- Spangher, L., Gokul, A., Khattar, M., Palakapilly, J., **Agwan, U.**, Tawade, A., & Spanos, C. (2020). Augmenting Reinforcement Learning with a Planning Model for Optimizing Energy Demand Response. *1st International Workshop on Reinforcement Learning for Energy Management in Buildings & Cities*.
- Spangher, L., Gokul, A., Palakapilly, J., **Agwan, U.**, Khattar, M., Ma, W. J., & Spanos, C. OfficeLearn: An OpenAI Gym Environment for Reinforcement Learning on Occupant-Level Building's Energy Demand Response. *Workshop on Tackling Climate Change with Machine Learning at the Thirty-fourth Conference on Neural Information Processing Systems (NeurIPS 2020)*