Mads Almassalkhi
Curriculum Vitae

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Website and LinkedIn and Google Scholar

Education

2008 - 2013	**Ph.D. in Electrical Engineering: Systems**, *Univ of Michigan*, Ann Arbor, MI.
	Dissertation title: Optimization & Model-Predictive Control for Overload Mitigation in Resilient Power Systems
	Area of study: Power Systems, Optimization, Predictive control
	Advisor: Vennema Professor Ian A. Hiskens
2008-2010	**M.S. in Electrical Engineering: Systems**, *Univ of Michigan*, Ann Arbor, MI.
	Major: Control Theory **Minor:** Mathematics
2003-2008	**B.S. in Electrical Engineering**, *Univ of Cincinnati*, Cincinnati, OH.
	Dual Degree: Applied Mathematics
	Graduated Summa Cum Laude.

Professional Appointments

Academia

2022 - present	**L. Richard Fisher Professor of Electrical Engineering**, Univ. of Vermont, Burlington, VT.
2021 - present	**Associate Professor**, *Electrical Engineering*, Univ. of Vermont, Burlington, VT.
	○ **Director of CORE (Control and Optimization of Renewable Energy) Systems Laboratory**
	– **Research themes**: optimization & control for grid resilience and clean energy systems integration
2021 - present	**Gund Fellow**, *Gund Institute for the Environment*, Univ. of Vermont, Burlington, VT.
2019 - present	**Founding Director**, *VECTORS: Vermont's center for sustainable and resilient systems*, Univ of Vermont, Burlington, VT.
	○ Lead and coordinate faculty efforts across the college to sustain and strengthen funded research and industry opportunities in the area of power and energy systems.
2021 - 2022	**Otto Mønsted Visiting Professor**, *Center for Electric Power & Energy*, Technical University of Denmark, Denmark.
	○ Funded professorship during my sabbatical at DTU Wind and Energy Systems (WES) and Aalborg University (AAU) Department of Electronic Systems.
2014 - 2021	**Assistant Professor**, *Electrical Engineering*, Univ. of Vermont, Burlington, VT.
2009–2013	**Graduate Student Research Assistant**, *MPEL*, Univ. of Michigan, Ann Arbor, MI.
	Advisor: Professor Ian A. Hiskens
	○ Studied optimization-based control for resilient energy systems with applications to transmission networks and energy storage. Supported by DOE (ARRA) and ARPA-E (GENI) funding.
	○ Developed suitable convex power systems models within a bi-level predictive control scheme to mitigate effects of cascading failures in electric networks with renewables and energy storage.
	○ Advanced the optimization of multi-energy systems (MES) within context of energy hubs.
2008–2009	**Graduate Student Fellow**, *MADCL*, Univ of Michigan, Ann Arbor, MI.
	Supervisor: Professor Domitilla Del Vecchio
	○ Collaborated with group members on NSF-sponsored project on safety in a semi-autonomous systems by developing probabilistic human behavior models for the design of control algorithms.

Government

2021 - present	**Chief Scientist**, *Pacific Northwest National Laboratory (PNNL)*, Richland, WA.
	○ Joint appointment in the Optimization and Control group within Electricity Infrastructure and Buildings Division in the Energy and Environment Directorate.
	○ My responsibilities include proposing, leading, and supporting funded R&D&D projects with the U.S. Department of Energy and power/energy industry.

Industry

2022 – present   **Co-founder**, *Fair & Fornuftig (FoF)*, Copenhagen, Denmark.
- Leveraged my position of privilege, as a professor/academic, to coordinate and promote sensible and actionable immigration reform in Denmark during my sabbatical. These efforts led to multiple publications in major Danish media outlets, including a government brief on Family Reunification and an op-ed in RAESON.dk.
- Government has now responded to media pressures and has laid out immigration reforms that align with our briefs and positions.
- Recipient of the Copenhagen Goodwill Ambassador Award in 2022 (with my co-founder, Ben Schenkel)

2016 – 2023   **Co-founder**, *Packetized Energy*, Burlington, VT.
- Spun out company after ARPA-E NODES award
- Working with technical and business team to develop technology partnerships with manufacturers to scale capability, deployment, and business models.
- Representing company at investor and tech events and support fund raising.
- Leading federal collaboration efforts directly resulting in >\$1M in DOE awards:
  - 2020-2022: Co-PI. ARPA-E PERFORM (sub: \$420,000). Lead: NREL.
  - 2020-2022: Co-PI. EERE/BTO BENEFIT (sub: \$100,000). Lead: Northeastern University.
- Entire company and technology stack acquired by largest DR provider in the U.S., EnergyHub, to give our technology access to over 1,000,000 devices.

2011 – 2014   **Lead Systems Engineer**, *Root3 Technologies*, Chicago, IL.
- Developed predictive energy analytics algorithms for SaaS platform for large C&I energy consumers.
- Develop engineering analysis tools for economic viability studies of cogeneration, PV solar, and thermal storage systems.
- Led development of energy asset plant models that are amenable to efficient optimization.
- Worked closely with software team to deploy optimization algorithms and develop UI/UX.

2005–2008   **Junior Technical Associate**, *Etegent Technologies*, Norwood, OH.
- Collaborated with managers on NIH and DOD projects and SBIR proposals resulting in >\$1M in awards.

List of Peer-Reviewed, Archived Publications

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Publications Under Review

[1] M. Banaei, F. D'Ettorre, R. Ebrahimy, *et al.*, "Procuring Flexibility in Power Systems with Incentive-based Grid Access Requests," (Under review).

[2] **H. Mavalizadeh** and M. R. Almassalkhi, "Decomposed Phase Analysis using Convex Inner Approximations: a Methodology for DER Hosting Capacity in Distribution Systems," (Under review at the Power Systems Computations Conference - PSCC 2024).

[3] **T. Mishra**, A. Pandey, and M. R. Almassalkhi, "Predictive Optimization of Hybrid Energy Systems with Temperature Dependency," (Under review at the Power Systems Computations Conference - PSCC 2024).

[4] **W. Owonikoko**, **M. El-Saadany**, A. Pandey, and M. R. Almassalkhi, "Optimization-based Framework for Selecting Under-frequency Load Shedding Parameters," (Under review at the Power Systems Computations Conference - PSCC 2024).

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Published/Accepted Peer-reviewed Journal papers

[1] M. R. Almassalkhi and S. Kundu, "Intelligent Electrification as an enabler of Clean Energy and Decarbonization," *Current Sustainable Renewable Energy Report*, Sep. 2023. DOI: https://doi.org/10.1007/s40518-023-00228-z.

[2] S. Brahma, **A. Khurram**, H. Ossareh, and M. R. Almassalkhi, "Optimal frequency regulation using packetized energy management," *IEEE Transactions on Smart Grid*, vol. 14, no. 1, pp. 341–353, 2023. DOI: 10.1109/TSG.2022.3197703.

[3] M. Matar, **H. Mavalizadeh**, S. Brahma, *et al.*, "Learning the state-of-charge of heterogeneous fleets of distributed energy resources with temporal residual networks," *Journal of Energy Storage*, vol. 70, p. 107 979, 2023, ISSN: 2352-152X. DOI: https://doi.org/10.1016/j.est.2023.107979.

[4] A. Pandey, M. R. Almassalkhi, and S. Chevalier, "Large-scale grid optimization: The workhorse of future grid computations," *Current Sustainable/Renewable Energy Reports*, Jul. 2023, ISSN: 2196-3010. DOI: 10.1007/s40518-023-00213-6.

[5] N. Qi, P. Pinson, M. R. Almassalkhi, *et al.*, "Chance-Constrained Economic Dispatch of Generic Energy Storage under Decision-Dependent Uncertainty," *IEEE Transactions on Sustainable Energy*, Mar. 2023, (Early Access). DOI: `10.1109/TSTE.2023.3262135`.

[6] **H. Basu**, Y. Pedari, M. Almassalkhi, and H. R. Ossareh, "Computationally efficient collision-free trajectory planning of satellite swarms under unmodeled orbital perturbations," *Journal of Guidance, Control, and Dynamics*, vol. 46, no. 8, pp. 1548–1563, 2023. DOI: `10.2514/1.G007206`.

[7] **H. Mavalizadeh**, L. D. Espinosa, and M. R. Almassalkhi, "Improving frequency response with synthetic damping available from fleets of distributed energy resources," *IEEE Transactions on Power Systems*, 2023. DOI: `10.1109/TPWRS.2023.3305435`.

[8] **N. Nazir** and M. Almassalkhi, "Guaranteeing a physically realizable battery dispatch without charge-discharge complementarity constraints," *IEEE Transactions on Smart Grid*, vol. 14, no. 3, pp. 2473–2476, 2023. DOI: `10.1109/TSG.2021.3109805`.

[9] **A. Khurram**, **M. Amini**, L. A. D. Espinosa, *et al.*, "Real-time grid and der co-simulation platform for testing large-scale der coordination schemes," *IEEE Transactions on Smart Grid*, vol. 13, no. 6, pp. 4367–4378, 2022. DOI: `10.1109/TSG.2022.3184491`.

[10] **M. Botkin-Levy**, A. Engelmann, T. Mühlpfordt, *et al.*, "Distributed control of charging for electric vehicle fleets under dynamic transformer ratings," *IEEE Transactions on Control Systems Technology*, vol. 30, no. 4, pp. 1578–1594, 2022. DOI: `10.1109/TCST.2021.3120494`.

[11] **N. Nazir** and M. Almassalkhi, "Grid-aware aggregation and realtime disaggregation of distributed energy resources in radial networks," *IEEE Transactions on Power Systems*, vol. 37, no. 3, pp. 1706–1717, 2022. DOI: `10.1109/TPWRS.2021.3121215`.

[12] S. Brahma, **N. Nazir**, H. Ossareh, and M. Almassalkhi, "Optimal and resilient coordination of virtual batteries in distribution feeders," *IEEE Transactions on Power Systems*, vol. 36, no. 4, pp. 2841–2854, 2021. DOI: `10.1109/TPWRS.2020.3043632`.

[13] L. A. D. Espinosa, **A. Khurram**, and M. Almassalkhi, "Reference-tracking control policies for packetized coordination of heterogeneous der populations," *IEEE Transactions on Control Systems Technology*, vol. 29, no. 6, pp. 2427–2443, 2021. DOI: `10.1109/TCST.2020.3039492`.

[14] **N. Nazir** and M. Almassalkhi, "Voltage positioning using co-optimization of controllable grid assets in radial networks," *IEEE Transactions on Power Systems*, vol. 36, no. 4, pp. 2761–2770, 2021. DOI: `10.1109/TPWRS.2020.3044206`.

[15] M. Almassalkhi, S. Brahma, **N. Nazir**, *et al.*, "Hierarchical, grid-aware, and economically optimal coordination of distributed energy resources in realistic distribution systems," *Energies (Special issue: Building-to-Grid Integration through Intelligent Optimization and Control)*, vol. 13, no. 23, 2020, (Invited). DOI: `10.3390/en13236399`.

[16] L. A. Duffaut Espinosa and M. Almassalkhi, "A packetized energy management macromodel with quality of service guarantees for demand-side resources," *IEEE Transactions on Power Systems*, vol. 35, no. 5, pp. 3660–3670, 2020. DOI: `10.1109/TPWRS.2020.2981436`.

[17] **A. Khurram**, L. Duffaut Espinosa, R. Malhame, and M. Almassalkhi, "Identification of Hot Water End-use Process of Electric Water Heaters from Energy Measurements," *Electric Power Systems Research*, vol. 189, p. 106 625, 2020, *(Note: paper was also presented at the 2020 Power Systems Computation Conference (PSCC) - 30% acceptance rate)*, ISSN: 0378-7796. DOI: `https://doi.org/10.1016/j.epsr.2020.106625`.

[18] **M. Amini** and M. Almassalkhi, "Optimal corrective dispatch of uncertain virtual energy storage systems," *IEEE Transactions on Smart Grid*, vol. 11, no. 5, pp. 4155–4166, 2020.

[19] **N. Nazir** and M. Almassalkhi, "Stochastic multi-period optimal dispatch of energy storage in unbalanced distribution feeders," *Electric Power Systems Research*, vol. 189, p. 106 783, 2020, *(Note: paper was also presented at the 2020 Power Systems Computation Conference (PSCC) - 30% acceptance rate)*, ISSN: 0378-7796. DOI: `https://doi.org/10.1016/j.epsr.2020.106783`.

[20] **N. Nazir**, P. Racherla, and M. Almassalkhi, "Optimal multi-period dispatch of distributed energy resources in unbalanced distribution feeders," *IEEE Transactions on Power Systems*, vol. 35, no. 4, pp. 2683–2692, 2020. DOI: `10.1109/TPWRS.2019.2963249`.

[21] **Z. Hurwitz**, Y. Dubief, and M. Almassalkhi, "Economic efficiency and carbon emissions in multi-energy systems with flexible buildings," *International Journal of Electrical Power & Energy Systems*, vol. 123, pp. 106–114, 2020. DOI: `https://doi.org/10.1016/j.ijepes.2020.106114`.

[22] S. R. Shukla, S. Paudyal, and M. R. Almassalkhi, "Efficient distribution system optimal power flow with discrete control of load tap changers," *IEEE Transactions on Power Systems*, vol. 34, no. 4, pp. 2970–2979, 2019. DOI: `10.1109/TPWRS.2019.2894674`.

[23] M. Almassalkhi and I. Hiskens, "Model-Predictive Cascade Mitigation in Electric Power Systems with Storage and Renewables Part I: Theory and implementation," *IEEE Transactions on Power Systems*, vol. 30, no. 1, pp. 67–77, Jan. 2015. DOI: 10.1109/TPWRS.2014.2320982.

[24] ——, "Model-Predictive Cascade Mitigation in Electric Power Systems with Storage and Renewables Part II: Case study," *IEEE Transactions on Power Systems*, vol. 30, no. 1, pp. 78–87, Jan. 2015. DOI: 10.1109/TPWRS.2014.2320988.

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Published/Accepted Peer-reviewed Conference papers

[1] **H. Mavalizadeh** and M. R. Almassalkhi, "Methodology for comparing the performance of DER coordination schemes in providing frequency regulation," in *IEEE PES General Meeting*, Jul. 2023.

[2] **M. El-Saadany** and M. R. Almassalkhi, "Battery Optimization for Power Systems: Feasibility and Optimality," in *IEEE Conference on Decision and Control*, Dec. 2023.

[3] S. Brahma, H. Ossareh, and M. R. Almassalkhi, "Statistical Modeling and Forecasting of Automatic Generation Control Signals," in *IREP Symposium - Bulk Power System Dynamics and Control*, Jul. 2022.

[4] S. Chevalier and M. R. Almassalkhi, "Towards Optimal Kron-based Reduction Of Networks (Opti-KRON) for the Electric Power Grid," in *IEEE Conference on Decision and Control*, Dec. 2022.

[5] A. Khan, S. Paudyal, and M. Almassalkhi, "Performance Evaluation of Network-Admissible Demand Dispatch in Multi-Phase Distribution Grids," in *IREP Symposium - Bulk Power System Dynamics and Control*, Jul. 2022.

[6] O. Oyefeso, G. Ledva, I. Hiskens, *et al.*, "Control of Aggregate Air-Conditioning Load using Packetized Energy Concepts," in *IEEE Conference on Control Technology and Applications (CCTA)*, Aug. 2022.

[7] **A. Khurram**, M. Almassalkhi, and L. Duffaut Espinosa, "A Group-based Approach for Heterogeneity in Packetized Energy Management," in *IEEE Conference on Control Technology and Applications (CCTA)*, Aug. 2022.

[8] **H. Basu**, M. Almassalkhi, and H. Ossareh, "Fuel-Optimal Trajectory Planning of Satellites Using Minimum Distance Assignment and Comparative Analysis of Relative Dynamics under J2 and Air Drag," in *American Control Conference*, Jun. 2022.

[9] **N. Nazir** and M. Almassalkhi, "Market mechanism to enable grid-aware dispatch of Aggregators in radial distribution networks," in *IREP Symposium - Bulk Power System Dynamics and Control*, Jul. 2022.

[10] **N. Nazir**, I. A. Hiskens, and M. R. Almassalkhi, "Exploring reactive power limits on wind farm collector networks with convex inner approximations," in *IREP Symposium - Bulk Power System Dynamics and Control*, Jul. 2022.

[11] S. Brahma, M. Almassalkhi, and H. Ossareh, "Optimal Control of Virtual Batteries using Stochastic Linearization," in *IEEE Conference on Control Technology and Applications (CCTA)*, Aug. 2021.

[12] **A. Khurram**, L. Duffaut Espinosa, and M. Almassalkhi, "A Methodology for Quantifying Flexibility in a fleet of Diverse DERs," in *IEEE PES PowerTech*, Jun. 2021.

[13] L. Duffaut Espinosa, **A. Khurram**, and M. Almassalkhi, "A Virtual Battery Model for Packetized Energy Management," in *IEEE Conference on Decision and Control*, Dec. 2020.

[14] **H. Mavalizadeh**, L. Duffaut Espinosa, and M. Almassalkhi, "Decentralized Frequency Control using Packet-based Energy Coordination," in *IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (SmartGridComm)*, Nov. 2020.

[15] N. Nazir and M. Almassalkhi, "Convex inner approximation of the feeder hosting capacity limits on dispatchable demand," in *IEEE Conference on Decision and Control*, Nice, France, 2019.

[16] **A. Khurram**, K. Desrochers, V. Hines, *et al.*, "Real-world, full-scale validation of power balancing services from packetized virtual batteries," in *IEEE PES Conference on Innovative Smart Grid Technologies (ISGT)*, Washington, D.C., Feb. 2019.

[17] **M. Amini**, **A. Khurram**, A. Klem, *et al.*, "A Model-Predictive Control Method for Coordinating Virtual Power Plants and Packetized Resources, with Hardware-in-the-Loop Validation," in *IEEE PES General Meeting*, Atlanta, Georgia, 2019.

[18] L. D. Espinosa, M. Almassalkhi, P. D. H. Hines, and J. Frolik, "System Properties of Packetized Energy Management for Aggregated Diverse Resources," in *Power Systems Computation Conference*, Dublin, Ireland, 2018.

[19] **M. Amini** and M. Almassalkhi, "Trading off robustness and performance in receding horizon control with uncertain energy resources," in *Power Systems Computation Conference*, Dublin, Ireland, 2018.

[20] **N. Nazir** and M. Almassalkhi, "Receding-horizon optimization of unbalanced distribution systems with time-scale separation for discrete and continuous control devices," in *Power Systems Computation Conference*, Dublin, Ireland, 2018.

[21] **S. Brahma**, M. Almassalkhi, and H. Ossareh, "A Stochastic Linearization Approach to Optimal Primary Control of Power Systems with Generator Saturation," in *IEEE Conference on Control Technology and Applications*, Copenhagen, Denmark, 2018.

[22] M. Almassalkhi, J. Frolik, and P. Hines, "Packetized energy management: asynchronous and anonymous coordination of thermostatically controlled loads," in *American Control Conference*, 2017.

[23] L. D. Espinosa, M. Almassalkhi, P. D. H. Hines, and J. Frolik, "Aggregate Modeling and Coordination of Diverse Energy Resources Under Packetized Energy Management," in *IEEE Conference on Decision and Control*, Melbourne, Australia, Dec. 2017.

[24] L. Duffaut Espinosa and Mads Almassalkhi and Paul Hines and **S. Heydari** and Jeff Frolik, "Towards a Macromodel for Packetized Energy Management of Resistive Water Heaters," in *IEEE Conference on Information Sciences and Systems*, 2017.

[25] M. Almassalkhi, Y. Dvorkin, J. Marley, *et al.*, "Incorporating storage as a flexible transmission asset in power system operation procedure," in *Power Systems Computation Conference*, 2016.

[26] M. Almassalkhi and **A. Towle**, "Enabling city-scale multi-energy optimal dispatch with energy hubs," in *Power Systems Computation Conference*, Genoa, Italy, 2016.

[27] **M Amini** and M. Almassalkhi, "Investigating delays in frequency-dependent load control," in *IEEE Innovative Smart Grid Technologies Asia*, 2016.

[28] M. Almassalkhi, B. Simon, and A. Gupta, "A Novel Online Energy Management Solution for Energy Plants," in *IEEE Power Systems Conference*, 2014.

[29] M. Almassalkhi and I. Hiskens, "Temperature-based Model-Predictive Cascade Mitigation in Electric Power Systems," in *IEEE Conference on Decision and Control*, Dec. 2013.

[30] ——, "Impact of Energy Storage on Cascade Mitigation in Multi-energy Systems," in *IEEE Power and Energy Society General Meeting*, Jul. 2012.

[31] R. Hermans, M. Almassalkhi, and I. Hiskens, "Incentive-based Coordinated Charging Control of Plug-in Electric Vehicles at the Distribution-transformer Level," in *IEEE American Control Conference*, Jun. 2012.

[32] M. Almassalkhi and I. Hiskens, "Cascade mitigation in energy hub networks," in *IEEE Conference on Decision and Control*, Dec. 2011.

[33] ——, "Optimization framework for the analysis of large-scale networks of energy hubs," in *Power Systems Computation Conference*, Aug. 2011.

<p style="text-align:center">*</p>

Book chapters, technical reports, magazine articles, and popular media

[34] M. Almassalkhi, *Packetized energy management: Coordinating transmission and distribution*, Final Technical Report for ARPA-E NODES Project, Mar. 2023. DOI: 10.2172/1975061.

[35] M. Almassalkhi, J. Frolik, and P. Hines, *How To Prevent Blackouts By Packetizing The Power Grid*, IEEE Spectrum Magazine, Feb. 2022.

[36] M. R. Almassalkhi and B. Schenkel, *Danish immigration policies will be expensive in the long run (article in danish)*, RAESON.dk, May 5, 2022.

[37] M. Almassalkhi, *Robust and resilient coordination of feeders with uncertain distributed energy resources: From real-time control to long-term planning*, Final Technical Report for SETO ENERGISE Project, Oct. 2020. DOI: 10.2172/1770015. [Online]. Available: https://www.osti.gov/biblio/1770015.

[38] M. Almassalkhi, L. Duffaut-Espinosa, P. Hines, *et al.*, "Asynchronous coordination of distributed energy resources with packetized energy management," in *Energy Markets and Responsive Grids*, J. Stoustrup and S. Meyn, Eds., Springer, 2018.

[39] M. Almassalkhi and I. Hiskens, "Impact of energy storage on cascade mitigation in multi-energy systems," in *Energy Storage for Smart Grids: Planning and Operation for Renewable and Variable Energy Resources*, P. Du and N. Lu, Eds., Elsevier, 2015.

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Intellectual Property (IP) - Patents / Inventions / Disclosures

[1] M. Almassalkhi, H. Mavalizadeh, and L. A. D. Espinosa, "Decentralized frequency control with packet-based energy management," pat., (U.S. Patent Application No. 17/305,491), Jul. 2021.

[2] J. Frolik, P. Hines, and M. Almassalkhi, "Packetized energy management control systems and methods of using the same," pat., U.S. Patent No.: 11,150,618 B2 (Issued: Oct. 19, 2021), 2021. [Online]. Available: https://patents.google.com/patent/US20190324415A1/.

[3] ——, "Systems and methods for randomized, packet-based power management of conditionally-controlled loads and bi-directional distributed energy storage systems," pat., U.S. Patent Application No. 15/712,089, 2016. [Online]. Available: `https://patents.google.com/patent/WO2018057818A1`.

Externally Funded Projects (Total funding as PI $> \$11M$)

2023–2024   **Co-I (PI: Energy Cluster, Denmark)**, *Danish Government*, $100,000.
- **Title**: Cross-Atlantic Network on System Integration (CANSI)
- **Goal:** The aim of CANSI is to develop a set of international workshops and papers that deepen the already-established collaboration between DK and US partners while investigating, evaluating, and mapping out some of the challenges for a large-scale expansion of renewable generation.
- **Collaborators**: Numerous US-based colleagues and Danish universities (DTU and AAU).

2023–2026   **Co-PI (PI: Jeff Marshall)**, *DOE EERE*, $4,300,000.
- **Title**: Enabling Place-Based Power Generation using Community Energyshed Design
- **Goal:** The project goal is to develop the tools and processes to help community stakeholders evaluate the economic, environmental, and social trade-offs of energyshed characteristics to enable a more just and resilient transition to distributed renewable energy generation.
- **Collaborators**: Numerous UVM colleagues and Vermont industry partners and DOE labs (PNNL, NREL, and Sandia).

2023–2027   **PI**, *DOE EERE/SETO*, $4,000,000.
- **Title**: Hybrid Energy System Platform for Cold Weather Climates
- **Goal:** This project will enable a holistic techno-economic analysis of hybrid energy systems (HESs) in cold weather climates. The project's outcomes will be (1) advanced modeling, control, and optimization tools for HESs across a range of temperatures and timescales suitable for operation and planning; (2) testing of these new tools in a new accelerated testing laboratory (ATL) at UVM for hardware-enabled validation and data analysis and; (3) field validation of the tools at a new Hybrid Solar Test Center (HSTC) in Burlington, Vermont.
- **Collaborators**: VEIC (techno-economic analysis) and CleanPowerResearch (forecasting)

2022–2024   **Co-I (PI: Bindu Panikkar)**, *Sloan Foundation*, $500,000.
- **Title**: Integrated renewable energy community microgrid transitions in remote rural and Indigenous communities in Alaska
- **Goal:** Study rural energy communities in Alaska and the role of coordination/control architectures in enabling equitable electrification and renewable energy transition.
- **Collaborators**: ACEP at Uni. of Alaska - Fairbanks

2022–2025   **PI**, *PNNL/DOE*, $600,000.
- **Title**: Coordinated Distributed Assets to Provide System Flexibility
- **Goal:** Advance how transmission system operations can indirectly leverage distributed assets for improved grid reliability.
- **Collaborators**: PNNL (data, simulations) and VELCO (grid data, practice)

2021–2026   **PI**, *NSF CAREER (EPCN)*, $500,000.
- **Title**: Enabling grid-aware aggregation and real-time control of distributed energy resources in electric power distribution systems
- **Goal:** Intellectual: overcomes asymmetry of information and control between grid operator and DER aggregator using convex inner approximations of the distribution OPF to form dynamic hosting capacities and real-time grid-aware control of DERs. Broader: Positions the field of power systems as climate change mitigation technology to builds curriculum around climate change for STEM and non-STEM students using gamification.
- **Collaborators**: PNNL (learning) and ConEdison (grid data)

2020–2023   **Co-PI**, *NASA EPSCoR*, $750,000, (UVM Lead; Dr. Hamid Ossareh).
- **Title**: New Unified Framework for Scalable, Risk-Aware, and Resilient Estimation and Control of Satellite Swarms
- **Goal:** Develop control and optimization algorithms to coordinate a swarm of small satellites.
- **Partners**: Benchmark Space Systems, Swarm, JPL.

2020–2022   **Co-PI (w/ Packetized Energy)**, *DOE/BTO BENEFIT*, $2,200,000 (PE sub of $125,000).
- **Title**: Grid-interactive Efficient Building Equipment Performance Dataset.
- **Goal:** Develop occupant-centric control algorithms that produce grid services from heat pumps.

- **Partners**: Northeastern University (Lead; Dr. Michael Kane), NREL, ecobee.

2020–2022 **Co-PI (w/ Packetized Energy)**, *ARPA-E PERFORM*, $3,408,526 (PE sub of $420,000).
- **Title**: An Integrated Paradigm for the Management of Delivery Risk in Electricity Markets: From Batteries to Insurance and Beyond.
- **Goal:** Technology to mitigate effects of uncertainty in DER aggregations for market participation
- **Partners**: NREL (Lead; Dr. Elina Spyrou), EPRI, JHU, kWh Analytics.

2017-2020 **Lead PI**, *DOE EERE ENERGISE*, $2,500,000.
- **Title**: Robust and resilient coordination of feeders with uncertain distributed energy resources: from real-time control to long-term planning
- **Goal:** Adapt wide-area control concepts to advanced distribution system operation to enable extreme solar PV penetration by optimizing control of energy-constrained DERs.
- **Partners**: JHU, PNNL, NIST, ConEdison of NY, Orange & Rockland Utility
- **Key project outcomes:**
  - Developed multi-timescale Grid+DER techno-economic optimization platform

2017-2020 **Co-PI**, *Vermont Electric Company (VELCO)*, $297,000, (UVM Lead: Paul Hines).
- **Title**: Stochastic Receding Horizon Optimal Power Flow Given High-resolution Weather Forecasts
- **Goal:** Demonstrate and validate how VT RPS affect transmission system reliability.
- **Partners**: VELCO

2016-2023 **Lead PI**, *ARPA-E NODES*, $3,900,000.
- **Title**: Packetized Energy Management: Coordinating Transmission and Distribution.
- **Goal:** Develop technology to mitigate effects of DER uncertainty in aggregation and market participation
- **Partners**: FIU, Packetized Energy, Green Mountain Power, VELCO, and NIST
- **Key project outcomes:**
  - Co-founded and spun out company (*Packetized Energy*) to commercialize technology;
  - Successfully completed field demonstration of technology involving more than 150 VT homes.
  - Developed cyber-physical platform for real-time validation of DER coordination schemes;
  - Established & sustained an Industrial Advisory Board of more than 20 companies
  - Secured two years and $1.5M in follow-on funding in 2019 and another $500k in 2021.

2016-2017 **Co-I**, *UVM-GMP Industrial Partnership*, $161,480, (UVM Lead: Paul Hines).
- **Title**: From Big Data to Actionable Insight: Using Smart Grid Data to Identify Geographic Locations for Targeted Investment
- **Goal:** Build software and analytics tools to conduct hosting capacity with solar PV and battery storage.
- **Partners**: Green Mountain Power (GMP)

Internally-funded Projects

2022–2024 **Co-PI (PI: Bindu Panikkar)**, *UVM's Gund Institute for Environment*, $200,000.
- **Title**: Integrated renewable energy community microgrid transitions in remote rural and Indigenous communities in Alaska
- **Goal:** Study rural energy communities in Alaska and the role of coordination/control architectures in enabling equitable electrification and renewable energy transition.
- **Collaborators**: ACEP (data) and REAP (data)
- **Follow-on funding**: Sloan Foundation funded a $500k expanded version of this project.

Awards & Recognition

University of Vermont
- Copenhagen Goodwill Ambassador (Co-recipient), 2022
- L. Richard Fisher Professorship in Electrical Engineering, 2022
- First UVM Startup Acquired Award, 2022
- Otto Mønsted Visiting Professorship, 2022
- National Science Foundation CAREER Award, 2021
- UVM Innovation Hall of Fame Award (for licensing IP), 2019

- IEEE GMS Faculty of the Year Award, 2019
- IEEE GMS PES Chapter Outstanding Young Engineer of the Year Award, 2019
- UVM College of Engineering and Mathematical Sciences Junior Faculty of the Year, 2016
- IEEE GMS PES Chapter Outstanding Young Engineer of the Year Award, 2015
- Nominated for the UVM Kroepsch-Maurice Excellence in Teaching Award, 2015

University of Michigan

- The Towner Prize for Distinguished Academic Achievement, 2013
- CoE Graduate Symposium, 1st place in poster session, 2011
- National Science Foundation GRFP Top Honorable Mention, 2009
- Rackham Merit Fellow, 2008-2013

University of Cincinnati

- Jeanne Gulden Co-recipient (Top Department of Mathematics Award), 2008
- National Tau Beta Pi Record Scholar, 2007
- Alumni Foundation College of Engineering Scholar, 2007
- Engineering Alumni Scholar, 2007
- Hancock Scholarship Recipient, 2007
- Hancock and Kieval Scholarships Recipient, 2006
- Buck and Kieval Scholarships Recipient, 2005
- Cincinnatus Scholar, 2003-2008

Professional Affiliations and Overviews

Since 2007 **Senior IEEE Member**, *IEEE*, Control System (CSS) and Power & Energy (PES) Societies.

Since 2006 **Lifetime Member**, *Tau Beta Pi*, U.S. national engineering honor society.

2019-2021 **INFORMS Member**, *INFORMS*, Energy, Natural Resources, & the Environment Section (ENRE).

Research Overview

- **Lead externally funded research program in excess of \$10M as PI.**
    - Led team of more than 20 researchers across industry, national labs, and universities.
    - Past funders include: DOE/ARPA-E, EERE/SETO, NSF, and electricity industry partners.
    - Research translated to startup company, Packetized Energy, licensed IP, and software products.
- **Current CORE student members:**
    - 2022 - present - PhD EE: Mazen Elsaadany – Modeling and optimization of DERs
    - 2023 - present - PhD EE: Arash Omidi – Battery and inverter modeling and control
    - 2023 - present - PhD EE: Beyzanur Aydin – DER hosting capacity
    - 2023 - present - PhD EE: Eric Segerstrom – Transmission system modeling
    - 2023 - present - PhD EE: Omid Mokhtari (Co-advised w/ Prof. Chevalier) – Networks
    - 2022 - present - MS EE: Waheed Owonikoko – Adaptive load control for transmission systems
    - 2021 - present - BS EE: Rebecca Holt – Dynamic and equitable solar PV curtailment
    - 2023 - present - BS EE: Emily Ninestein – Distribution feeder simulation and hosting capacity
    - 2023 - present - BS EE: Kendall Meienhofer – Predictive energy storage modeling

○ **CORE alumni**
  – 2017-21: PhD EE: Dr. A. Khurram – Modeling and control of Aggregated DERs.
    (Assistant Research Scientist at UCSD in San Diego, CA)
  – 2017-20: PhD EE: Dr. N. Nazir – Optimization of energy-constrained DERs in distr. networks
    (Research Engineer at PNNL in Richmond, WA)
  – 2014-19: PhD EE: Dr. M. Amini – Optimal dispatch of uncertain energy resources
    (Lead Analyst at National Grid in Dallas, TX)
  – 2018-19: MS ME: Mr. Zach Hurwitz – Multi-energy system with flexible buildings
    (Employed at Siemens in Scarborough, ME)
  – 2017-19: MS EE: Mr. Micah Botkin-Levy – Optimal control of EV charging
    (Senior Modeling Engineer at Form Energy in San Francisco, CA)
  – 2015-17: MS EE: Mr. Lincoln Sprague – Distribution feeder modeling and inverters
    (Lead Compliance Engineer at Dynapower in South Burlington, VT)
  – 2020 - 2021 - BS EE: Mr. Sam Knox – Distribution Substation Transformer Thermal Modeling.
  – 2016: BS EE: Ms. Anna Towle – Multi-energy systems optimization
    (MS EE from KTH, Sweden. Employed at Fortum in Sweden)
○ **Post-doctoral and research scientist alumni in CORE Systems Lab**
  – 2023 - present - Post-doc: Dr. Tanmay Mishra – Predictive modeling, optimization, and
    control of hybrid energy systems
  – 2023 - present - Post-doc: Dr. Dakota Hamilton – Enabling decarbonization and electrification
    with energysheds
  – 2020 - 2022 - Post-doc: Dr. Himadri Basu (Jointly advised with Prof. Hamid Ossareh) –
    Optimal trajectory assignment and collision avoidance in satellite swarms
  – 2021: Post-doc: Dr. Nawaf Nazir – Grid-aware flexibility from DERs
    (Pacific Northwest National Lab)
  – 2017-20: Res. Faculty: Dr. Pavan Racherla – Three-phase distribution system modeling
    (Independent Power Systems Consultant)
  – 2016-19: Res. Faculty: Dr. Luis Duffault Espinosa – Modeling and control of DERs
    (Employed at UVM as TT faculty)

Teaching Overview (rigorous courses in power systems, controls, optimization)

○ Fall 2023: *EE 3315 - Electric Energy Conversion* (4 hrs, 10 students, IP)
○ Spring 2023: *EE 021 - Circuits II* (4 hrs, 18 students, 4.8/5.0)
○ Fall 2022: *EE 113 - Electric Energy Conversion* (4 hrs, 28 students, 4.2/5)
○ Fall 2022: *EE 303 - Convex Optimization* (3 hrs, 6 students, 4.7/5)
○ Spring 2021: *EE 303 - Convex Optimization* (3 hrs, 11 students, 4.8/5)
○ Fall 2020: *EE 215 - Power System Analysis* (3 hrs, 12 students, 4.1/5)
○ Spring 2020: *EE 113 - Electric Energy Conversion* (4 hrs, 25 students, 3.8/5.0)
○ Fall 2019: *EE 301 - Linear System Theory* (3 hrs, 19 students, 4.4/5.0)
○ Spring 2019: *EE 113 -Electric Energy Conversion* (4 hrs, 27 students, 4.1/5.0)
○ Fall 2018: *EE 395 - Convex Optimization* (3 hrs, 19 students, 4.1/5.0)
○ Spring 2018: *EE 113 - Electric Energy Conversion* (4 hrs, 18 students, 4.0/5.0)
○ Fall 2017: *EE 301 - Linear System Theory* (3 hrs, 21 students, 4.3/5.0)
○ Spring 2017: *EE 395 - Convex Optimization* (3 hrs, 17 students, 4.4/5.0)
○ Fall 2016: *EE 215 - Power System Analysis* (3 hrs, 11 students, 4.6/5.0)
○ Spring 2016: *EE/ME 210 - Control Systems* (3 hrs, 37 students, 4.6/5.0)
○ Fall 2015: *EE 301 - Linear System Theory* (3 hrs, 20 students, 4.5/5.0)
○ Spring 2015: *EE 113 - Electric Energy Conversion* (4 hrs, 10 students, 4.9/5.0)
○ Fall 2014: *EE 215 - Power System Analysis* (3 hrs, 16 students, 4.3/5.0)

Service Overview

2022-present	**Associate Editor**, *IEEE Transactions on Power Systems*.
2023-present	**Chair**, *IEEE CSS Technical Committee on Smart Grids*.
2020-21,22-present	**Graduate Program Director (EE)**, *Department of Electrical and Biomedical Engineering*, UVM.
2018-present	**Member**, IEEE PES Smart Buildings, Loads, and Customer Systems.

2019-2021	**Chair**, *Loads Subcommittee*, IEEE PES Smart Buildings, Loads, and Customer Systems (SBLC), Successfully conducted SBLC's first IEEE Standards process. Organized and led SBLC's response for IEEE PES Trending Tech topic on Intelligent Electrification
2018-2021	**Vice-Chair**, *IEEE PES Green Mountain Section*, Vermont, USA.
2018-2020	**Founding Vice-Chair**, *IEEE CSS Green Mountain Section*, Vermont, USA.
2017-2021	**Faculty Advisor**, *Tau Beta Pi - Alpha Chapter*, Vermont, USA.

External Committee Member	○ PhD Thesis (Committee member) - Polytechnique Montréal,, Canada (2023) ○ PhD Thesis (Committee member) - ETH Zürich, Switzerland (2023) ○ PhD Thesis (External reviewer) - Australian National University, Australia (2022) ○ PhD Thesis (External reviewer) - University of Melbourne, Australia (2020) ○ Tenure Promotion (External reference) - American University of Sharjah, UAE (2019) ○ MS Thesis (Committee member) - Michigan Technological University, USA (2018)

Funding Agency	NSF EPCN (2015, 2016, 2021), Sloan Foundation (2018), NSF ESPCoR RII Track 2 (2020), Swiss NSF (BRIDGE 2021), Luxembourg FNR (CORE 2023).

Reviewer - Journals:	Regularly: ○ *IEEE Transactions on Power Systems (IF=6.8) ○ *IEEE Transactions on Smart Grid (IF=10.5) ○ *IEEE Transactions on Control Systems Technology (IF=4.9) Sporadically: ○ *IEEE Transactions on Automatic Control (IF=5.1) ○ IEEE Transactions on Sustainable Energy (IF=6.2) ○ IEEE Access (IF=4.1) ○ IEEE Open Journal of Control Systems (OJ-CSYS) - Special issue: Control and Monitoring of Next-Gen Urban Infrastructure. ○ International Journal of Electrical Power & Energy Systems (IF=4.4) ○ Electric Power Systems Research (IF=3.2) ○ *Applied Energy (IF=8.6) (∗ flagship journal in respective field)
Reviewer - Conferences:	○ *Power Systems Computation Conference (PSCC): 2011-present ○ *IEEE Conference on Decision and Control (CDC): 2013-present ○ *American Control Conference (ACC): 2014-present ○ IEEE Power & Energy Society General Meeting (PESGM): 2017-present [as TPC 2019-present] ○ IEEE SmartGridComm (SGC): 2017-18 [as TPC in 2018] ○ Sporadically: ISMA (2018), IEEE CCTA (2018, 2021), *COMPEL (2020) (∗ flagship conference in respective field)
Workshops organized	○ Co-organizer of UVM-NIST Workshop on Smart Grid Testbeds (April, 2019, > 40 participants) ○ Co-organizer of UVM's Future of Energy Workshop (Sept. 2018; > 90 participants)
Panels organized or chaired	○ CISS 2023 - Chaired session *Optimization & Control of Networked DERs* (Mar, 2023) ○ IEEE PES T&D 2022 - organized session on *Network-aware DER coordination* (Apr., 2022) ○ INFORMS 2020 - organized session on *Optimization of Networked Energy Resources* (Nov, 2020) ○ IEEE PES GM 2020 - organized and co-chaired panel: SBLC: BTM DER coordination (Aug, 2020) ○ IEEE PES GMS - organized virtual panel on *Effects of COVID-19 on the Electric Grid* (May, 2020) ○ IEEE PES GM 2019 - organized and chaired three panels: (1) AMPS: Unbalanced OPF, (2) SBLC: DER architectures, and (3) PSOPE: DER optimization and control (Aug, 2019) ○ IEEE CDC 2019 - Co-chair of session on *Energy Systems* ○ ACC 2017 - Chair of session on *Scalable Networked Control for Smart Grid Ancillary Services*

Participation in conferences, workshops, and seminars

May 2011	**Workshop on Dynamics, Control and Pricing in Power Systems**, *Lund*, Sweden, Invited Scholar. Spent three weeks at Lund University performing research, collaborating with faculty and other PhD students from around the world, gave a seminar *(Cascade Mitigation in Energy Hub Networks)*, and attended workshop.

Aug 2011	**INFORMS Midwestern Conference**, *Columbus, Ohio*, USA, Invited Speaker.
	Presented parts of two papers: *Optimization Framework for the Analysis of Large-scale Networks of Energy Hubs* and *Cascade Mitigation in Energy Hub Networks*.
Aug 2011	**Power Systems Computation Conference**, *Stockholm*, Sweden, Speaker.
	Presented full paper *Optimization Framework for the Analysis of Large-scale Networks of Energy Hubs*.
Sep 2011	**Energy Club Conference**, *University of Michigan*, USA, Poster.
	Cascade Mitigation in Multi-Energy Systems.
Oct 2011	**Symposium on Emerging Topics in Control and Modeling of Cyber-Physical Systems**, *University of Illinois at Urbana-Champaign*, USA, Poster.
	Incentive-based Coordinated Charging Control of Plug-in Electric Vehicles at the Distribution-Transformer Level
Nov 2011	**College of Engineering Graduate Symposium**, *University of Michigan*, USA, Poster.
	Incentive-based Coordinated Charging Control of Plug-in Electric Vehicles at the Distribution-Transformer Level **(Placed 1st in Power and Control session)**
Mar 2012	**Conference on the Electricity Industry**, *Carnegie Mellon University*, USA, Poster.
	Robust Incentive-based Coordinated Charging Control of Plug-in Electric Vehicles at the Distribution-Transformer Level
May 2012	**CNLS Annual Conference: Smart Grid**, *Los Alamos National Lab*, USA, Invited Speaker.
	Model-predictive cascade mitigation in electric power systems with energy storage and renewable generation.
June 2012	**IEEE American Control Conference**, *Montreal*, Canada, Speaker.
	Co-presenter for paper on non-centralized Incentive-based MPC to solve PEV charging problem in a distribution-grid setting.
July 2012	**IEEE PES General Meeting**, *San Diego*, USA, Invited Panel Speaker.
	Presented paper on the effects of energy storage sizing on performance of a model-predictive cascade mitigation scheme in a transmission systems.
Nov 2012	**College of Engineering Graduate Symposium**, *University of Michigan*, USA, Poster.
	Model-predictive cascade mitigation in electric transmission networks with energy storage **(Placed 2nd in Energy session)**
April 2013	**CEIC Seminar**, *Carnegie Mellon University*, Pittsburg, USA, Invited Speaker.
	Temperature-based Model-predictive cascade mitigation in electric power systems.
Dec 2013	**Power Event**, *Technical University of Denmark*, Copenhagen, Denmark, Invited Speaker.
	Linear model-predictive cascade mitigation in AC electric power systems with energy storage.
Nov 2014	**Storage in Sustainable Electric Energy Systems: Technology Push and Policy Pull**, *McGill University*, Montreal, CA, Invited workshop attendee.
July 2015	**The Governor's Institute of Vermont**, *STEMBridge*, Burlington, VT, Invited speaker.
	Power and energy challenges in the 21st century
Aug 2015	**LTU-IEEE Seminar**, *Webinar*, USA, Invited speaker.
	Enabling resilient control of power systems with distributed energy storage
Oct 2015	**IEEE International Conference on the Edges of Innovation for Smarter Cities**, *Burlington*, USA, Invited speaker.
	Toward designing sustainable cities with energy hubs
Dec 2015	**ECE Seminar**, *University of Connecticut*, Mansfield, CT, Invited speaker.
	Enabling resilient control of power systems with distributed energy storage
May 2016	**IMA Annual Program Year Workshop - Control at Large Scales: Energy Markets and Responsive Grids**, *University of Minnesota*, USA, Invited workshop attendee.
Mar 2017	**UVIG Spring Technical Workshop**, *Tucson, AZ*, USA, Invited panelist.
	Packetized Energy Management - A New Approach to DSM
April 2017	**DOE panel at IEEE Innovative Smart Grid Technology Conference**, *Washington D.C.*, Invited panelist, Enabling Extreme Real-time Grid Integration of Solar Energy.
June 2017	**Invited Seminar**, *Aalborg University*, Aalborg, Denmark, Invited Speaker.
	Towards a digital grid with packetized energy management
July 2017	**Invited Seminar**, *Denmark's Technical University*, Lyngby, Denmark, Invited Speaker.
	Towards a digital grid with packetized energy management
Aug 2017	**Autonomous Energy Grids Workshop**, *Golden, CO*, Invited workshop attendee.

Sept 2017	**Rethinking Modeling, Simulations, and Control for the Changing Electric Energy Industry Workshop**, *MIT*, Boston, MA, Invited speaker. Packetized Energy Management: a new platform for coordinating distributed energy resources
Oct 2017	**ECE Seminar**, *Rensselaer Polytechnic Institute*, Troy, NY, Invited speaker.
Feb 2018	**Engineering Seminar**, *Michigan Technological University*, Houghton, MI, Invited speaker. Coordinating flexible energy resources with packetized energy management
June 2018	**Lunch-and-Learn**, *Telefonica-Alpha*, Barcelona, Spain, Invited speaker. Packetized Energy Management
Aug 2018	**ESIF Seminar**, *NREL*, Golden, CO, Invited speaker. Towards scalable integration of DERs to enable extreme penetration of renewable energy
Aug 2018	**Lunch-and-Learn**, *Oersted*, Fredericia, Denmark, Invited speaker. Packetized energy management
Oct 2018	**University of Pennsylvania**, *Wharton Energy Conference*, Philadelphia, PA, Invited panelist. Packetized energy management
Nov 2018	**Trans-Atlantic Infraday Conference**, *FERC*, Washington, DC, Student presented. Three-phase OPF software for economic dispatch of continuous and discrete control assets
Feb 2019	**PRECISE Seminar**, *University of Pennsylvania*, Philadelphia, PA, Invited speaker. Real-Time, Scalable Coordination of Smart Appliances with Packetized Energy Management
Mar 2019	**ECE/FEEDER Seminar**, *University of Kentucky*, USA, Invited speaker. Real-Time, Scalable Coordination of Smart Appliances with Packetized Energy Management
Mar 2019	**IEEE Conference on Information Sciences and Systems**, *Johns Hopkins University*, Baltimore, MD, Invited talk. Towards 100% renewable generation with flexible demand: control & optimization
Apr 2019	**Autonomous Energy Grids**, *NREL*, Golden, CO, Invited participant.
Apr 2019	**Young Professionals Webinar**, *IEEE PES*, Online (Global audience), Invited speaker. I'm an entrepreneurial electrical engineer (iEEE): from academia to startups
May 2019	**SETO Planning & Operations Workshop**, *DOE*, Washington, DC, Invited speaker. Robust and resilient coordination of feeders with uncertain distributed energy resources
May 2019	**Distribution System State Estimation Workshop**, *DOE/Northeastern University*, Boston, MA, Invited participant.
Jun 2019	**ARPA-E PERFORM Pre-program workshop**, *DOE*, New York, NY, Invited participant.
Aug 2019	**Panel on Enabling Advanced Grid Operations with DER coordination**, *IEEE PES General Meeting*, Atlanta, GA, Invited organizer and panelist.
Oct 2019	**Challenges in Energy Systems Network Optimization Panel**, *INFORMS Annual Meeting*, Seattle, WA, Invited speaker. Optimization-based Spatial Disaggregation of Virtual Batteries Over Power Networks
Oct 2019	**Seminar**, *Pacific Northwest National Labratory*, Richland, WA, Invited speaker. Towards flexible distribution systems
Nov 2019	**Trans-Atlantic Infraday Conference**, *FERC*, Washington, DC, Student presented. Enabling Real-time, Network-admissible Disaggregation of Market Services with Convex Inner Approximations
Nov 2019	**Symposium on Machine Learning, Optimization and Security for Future Energy Delivery Systems**, *IEEE GlobalSIP*, Ottawa, Canada, Invited speaker. Enabling Real-time, Network-admissible Disaggregation of Market Services with Convex Inner Approximations
Feb 2020	**IPAM Workshop on Learning, Control, and Optimization**, *UCLA*, Los Angeles, CA, Participant.
Feb 2020	**Use of AI to Optimize Behind-the-Meter Resources**, *IEEE Innovative Smart Grid Technology Conference*, Washington D.C., Invited panelist (student presented in my place). Innovative methods in coordinating demand-side resources: From papers to practice
Feb 2020	**EECS Seminar**, *MIT*, Boston, MA, Invited speaker. Unlocking demand-side flexibility with grid optimization and control

May 2020	**Virtual Roundtable on Smart Energy Services**, *Consumer Technology Association*, Webinar, Invited Panelist. Experiences and recommendations for smart energy standards
June 2020	**Solar & Storage Group**, *National Grid*, Online, Invited Speaker. Flexible Hosting Capacity
Aug 2020	**Grid Modernization & Resilience with Energy Storage**, *NY BEST Annual Conference*, Online, Invited Panelist. Dynamic Hosting Capacity
Aug 2020	**Architecture for DER Integration**, *IEEE PES General Meeting*, Online, Invited Panelist and Speaker. Utility and Aggregator interactions to support large-scale DER integration
Aug 2020	**Optimal Power Flow Methods for Realistic Power Distribution Networks**, *IEEE PES General Meeting*, Online, Invited Panelist and Speaker. Real-time Control Methods for Balanced Power Distribution Systems
Aug 2020	**Emerging issues on market-based coordination and control of BTM DERs**, *IEEE PES General Meeting*, Online, Invited Panelist and Speaker. Towards Decentralized Frequency Control with Packet-based Energy Coordination
Nov 2020	**Market Models and Optimization in Active Distribution Networks**, *INFORMS Annual Meeting*, Washington, DC, Invited Speaker. To be or not to be a Utility: Allocating Flexible Resources Across a Network for Different Market Signals
Feb 2021	**ECE Seminar**, *New York University*, Virtual, Invited Speaker. Towards scalable integration of distributed energy resources with packetized energy management
Mar 2021	**Gund Institute for Environment Seminar**, *UVM*, Virtual, Invited Speaker. Mitigating Climate Change with Power Engineering
Apr 2021	**IEEE PES Day**, *IEEE PES US & Canada Students*, Virtual, Invited Speaker. Engineering Innovation in Power and Energy Systems: from bulky MWs to nimble kWs
June 2021	**FERC**, *Technical Conference*, Virtual, Invited Panelist. Climate Change, Extreme Weather, & Electric System Reliability
June 2021	**Google**, *Virtual*, Invited Participant, Carbon Aware Computing Workshop.
June 2021	**Innovation Centre**, *Denmark*, Virtual, Invited Speaker. Towards large scale integration - energy islands and energy flexibility
June 2021	**U.S. Department of Energy**, *Solar Energy Technologies Office*, Virtual, Invited Speaker. ENabling Extreme Real-time Grid Integration of Solar Energy (ENERGISE) Program Final Workshop
Sept 2021	**Denmark's Technical University**, *Center for Electric Power & Energy*, Lyngby, Denmark, Speaker. Enabling flexible demand with distributed control of residential kW-scale devices
Sept 2021	**Smart Energy Systems International Conference**, Copenhagen, Denmark, Speaker. Exploring reactive power limits on wind farm collector networks with convex inner approximations
Oct 2021	**INFORMS Annual Meeting**, Anaheim, CA, Invited speaker. Guaranteeing a physically realizable battery dispatch without complementarity constraints
Oct 2021	**INFORMS Annual Meeting**, Anaheim, CA, Invited speaker. Grid-aware aggregation and realtime disaggregation of distributed energy resources in radial networks
Dec 2021	**Digital Tech Summit**, Copenhagen, Denmark, Invited speaker. New technologies, disruption and smart energy systems
Jan 2022	**Young Professionals in Energy (Boston)**, *US-Denmark Green Transition*, Virtual, Invited speaker. Flexing the grid with intelligent electrification
Feb 2022	**Innovation Centre Denmark**, *Transmission-Distribution interfaces, markets, and flexibility*, Virtual, Invited speaker. Indirect Control of Distributed Assets to provide System Flexibility
Mar 2022	**Energinet seminar**, *Virtual*, Invited speaker, EV charging & internet ideas.
Apr 2022	**IEEE PES T&D conference**, *New Orleans, LA*, Distribution Network-Aware Distributed Energy Resources Coordination., Co-chair.

May 2022	**Aalborg University**, *Department of Electronic Systems*, Aalborg, Denmark, Invited speaker. Enabling a responsive grid and flexibility at scale
May 2022	**Denmark Technical University**, *Department of Sustainability, Society, and Economics*, Lyngby, Denmark, Invited speaker. Enabling a responsive grid and flexibility at scale
May 2022	**NSF Sponsored joint US-European workshop**, *Zagreb, CR*, Invited participant and Scribe. Grid at the Edge: towards the zero-carbon power grid with improved visibility, safety and reliability
May 2022	**University of Manchester**, *Department of Electrical & Computer Engineering*, Manchester, England, Invited speaker. Enabling flexible demand with distributed control & optimization
June 2022	**TU Dortmund**, *Institut für Energiesysteme, Energieeffizienz und Energiewirtschaft (ie^3)*, Dortmund, Germany, Invited speaker. Enabling flexible demand with distributed control & optimization
June 2022	**Innovation Centre Denmark**, *Virtual*, Co-organizer and moderator, Large-scale system integration.
July 2022	**IEEE PES General Meeting**, Research and Educational Experiences of NSF CAREER Awardees in Power Systems, Invited panelist. Enabling grid-aware aggregation and real-time control of distributed energy resources in electric power distribution systems
July 2022	**IREP 2022 Symposium**, *Banff, CA*, Vice-Chair and presenter. Session on microgrids and presenter of three accepted, co-authored papers
Oct 2022	**DOE Wind Energy Technologies Office**, *Washington, DC*, Deep-dive workshop between Department of Energy and the Danish Energy Agency, Invited attendee. Transmission supporting broad-scale integration of Off-shore Wind
Oct 2022	**Renewable Energy Vermont Conference 2022**, *Burlington, VT*, Invited panelist. Vermont Clean and Resilient Energy Consortium - Making Vermont a Leader in Renewable Energy Research
Oct 2022	**Renewable Energy Vermont Conference 2022**, *Burlington, VT*, Invited moderator. The Future of Hydrogen in the Renewable Energy Landscape
Dec 2022	**IEEE Conference on Decision and Control 2022**, *Cancun, MX*, Invited paper. Towards Optimal Kron-based Reduction Of Networks (Opti-KRON) for the Electric Power Grid
Jan 2023	**2nd International Conference on Sustainable Technology and Advanced Computing in Electrical Engineering (ICSTACE)**, *Sardar Vallabhbhai National Institute of Technology (SVNIT), Surat, Gujarat, India*, Keynote speaker. Intelligent Electrification and Grid Optimization
Mar 2023	**Michigan Control Seminar**, *Ann Arbor, MI*, Invited seminar. Enabling a responsive grid with distributed load control and optimization
Mar 2023	**IEEE Conference on information Sciences and Systems**, *Baltimore, MD*, Invited session organizer and speaker. Distributed energy resource coordination across space and time: models, control, and networks
Mar 2023	**Gund Slam**, *Burlington, VT*, Invited Pitch. Characterizing the efficiency of transitioning communities to clean energy
April 2023	**Carnegie Mellon University**, *Pittsburg, PA*, Invited Speaker. Innovative entrepreneurial electrical engineering (iE3): academia and startups
April 2023	**National Science Foundation**, *Philadephia, PA*, Invited Speaker. US-European Joint NSF Workshop on Flexible Electric Grid Critical Infrastructure for Resilient Society
May 2023	**Massachussetts Institute of Technology**, *Boston, MA*, Invited Seminar. The Battle for Grid Flexibility: control architectures, information gaps, and grid optimization
May 2023	**University of Vermont**, *Burlington, VT*, Gund Institute for the Environment Research Slam.
Aug 2023	**ETH**, *Zürich, Switzerland*, Power Systems Laboratory, Invited seminar. Enabling a responsive grid with distributed load control and optimization
Sep 2023	**SETO Workshop**, *Boston, MA*, Northeastern University, Attendee. Distribution System Monitoring and Management