MOJDEH KHORSAND HEDMAN
(MAIDEN NAME: MOJDEH ABDI-KHORSAND)

School of Electrical, Computer and Energy Engineering mojdeh.khorsand@asu.edu
PO Box 875706 GWC 206 (480) 965-0787
Arizona State University, Tempe, AZ 85287-5706 Engineering Research Center (ERC) 525

Academic Appointment

Arizona State University **Aug. 2017-Present**
Assistant Professor
School of Electrical, Computer, and Energy Engineering

Education

Ph.D. in Electrical Engineering (Electric Power and Energy Systems) **Aug. 2012-May 2017**
Advisor: Professor Vijay Vittal
Arizona State University, Tempe, AZ
Dissertation: Analytical Approaches for Identification and Representation of Critical Protection Systems in Transient Stability Studies

M.Sc. in Electrical Engineering (Electric Power Systems) **Sep. 2008-Sep. 2010**
Iran University of Science and Technology, Tehran, Iran
Thesis: Determining the Optimal Amount of Reserves Considering Wind Power Generation in Power System Using Stochastic Optimization

B.Sc. in Electrical Engineering (Electric Power Systems) **Sep. 2003-Sep. 2007**
Mazandaran University, Mazandaran, Iran

Publications

Journal publications:

[J11] M. Ghaljehei and **M. Khorsand,** "Representation of Uncertainty in Electric Energy Market Models: Pricing Implication and Formulation," *IEEE Systems Journal,* accepted for publication.

[J10] Sadegh Kamali, Turaj Amraee, and **M. Khorsand**, "Intentional Power System Islanding against Cascading Outages Using Transient Energy Function Method," *IET Generation, Transmission & Distribution*, accepted for publication.

[J9] Y. Wang, V. Vittal, **M. Khorsand**, and C. Singh, "Composite System Reliability Evaluation with Essential Reliability Services Assessment of Wind Power Integrated Power Systems," *IEEE Open Access Journal of Power and Energy*, accepted for publication.

[J8] Y. Wang, V. Vittal, **M. Khorsand**, and C. Singh, "Probabilistic Reliability Evaluation Including Adequacy and Dynamic Security Assessment," *IEEE Transactions on Power Systems*, vol. 35, no. 1, Jan. 2020.

[J7] **M. Abdi-Khorsand** and V. Vittal, "Identification of Critical Protection Functions for Transient Stability Studies," *IEEE Transactions on Power Systems,* vol. 33, no. 3, pp. 2940 - 2948, May 2018.

[J6] **M. Abdi-Khorsand** and V. Vittal, "Modeling Protection Systems in Time-Domain Simulations: A New Method to Detect Mis-operating Relays for Unstable Power Swings," *IEEE Transactions on Power Systems,* vol. 32, no. 4, pp. 2790-2798, Jul. 2017.

[J5] X. Li, M. Sahraei-Ardakani, P. Balasubramanian, **M. Abdi-Khorsand**, K. W. Hedman, and R. Podmore, "Real-Time Contingency Analysis with Corrective Transmission Switching," *IEEE Transactions on Power Systems,* vol. 32, no. 4, pp. 2604 - 2617, Jul. 2017.

[J4] **M. Abdi-Khorsand**, M. Sahraei-Ardakani, and Y. Al-Abdullah, "Corrective Transmission Switching with *N*-1-1 Contingency Analysis," *IEEE Transactions on Power Systems,* vol. 32, no. 2, pp. 1606-1615, Mar. 2017.

[J3] M. Sahraei-Ardakani, X. Li, P. Balasubramanian, K. W. Hedman, and **M. Abdi-Khorsand**, "Real-Time Contingency Analysis With Transmission Switching on Real Power System Data," *IEEE Transactions on Power Systems,* vol. 31, no. 3, pp. 2501-2502, May 2016.

[J2] Y. Al-Abdullah, **M. Abdi-Khorsand**, and K. W. Hedman, "The Role of Out-of-Market Corrections in Day-Ahead Scheduling," *IEEE Transactions on Power Systems*, vol. 30, no. 4, pp. 1937-1946, Jul. 2015.

[J1] **M. Abdi-Khorsand** and H. Heydari, "Multiobjective Augmented Eps-constraint Optimization for Economic/Environmental Stochastic Unit Commitment in Power Systems with High Penetration of Wind Power," *International Review of Electrical Engineering*, vol. 5, no. 4, Aug. 2010.

Conference publications (peer reviewed):

[C16] R. Vakili and M.Khorsand, "Machine-Learning-based Advanced Dynamic Security Assessment: Prediction of Loss of Synchronism in Generators," *North American Power Symposium (NAPS)*, 2020.

[C15] R. Santoni, A. Chandwani, A. K. Shah, M. Khorsand, "Improving Distribution System Resiliency using Distribution Energy Resources," *North American Power Symposium (NAPS)*, 2020.

[C14] Byeongdoo Jeon and Mojdeh Khorsand, "Energy Management System in Naval Submarines," *IEEE Transportation Electrification Conference & Expo (ITEC)*, June 2020.

[C13] M. He, Z. Soltani, and **M. Khorsand**, "Two-Stage Distributed Energy Resources Scheduling via Chance-Constrained AC Optimal Power Flow: A Second-Order Cone Programming Approach," *the IEEE PES General Meeting 2020*, accepted.

[C12] M. He and **M. Khorsand**, "A Data-driven based Strategy to Evaluate Participation of Diverse Social Classes in Smart Electric Grids," *North American Power Symposium (NAPS)*, 2019.

[C11] P. Chatterjee, **M. Khorsand**, and K. W. Hedman, "Enhanced Assessment of Power System Behavior during Multiple Contingencies," *North American Power Symposium (NAPS)*, 2018.

[C10] T. Tesfay, M. Jamei, A. Scaglione, **M. Khorsand**, K. Hedman and R. Bazzi, "AVAIL: Assured Volt-Ampere Information Ledger," *IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (SmartGridComm)*, 2018.

[C9] X. Li, P. Balasubramanian, **M. Abdi-Khorsand**, A. Korad, and K. W. Hedman, "Effect of Topology Control on System Reliability: TVA Test Case," *CIGRE Grid of the Future*

Symposium 2014, pp. 1-8, Oct. 2014.

[C8] **M. Abdi-Khorsand** and K. W. Hedman, "Day-Ahead Corrective Transmission Topology Control," *In Proc. of the IEEE PES General Meeting 2014*, Washington, DC, Jul. 2014.

[C7] Y. Al-Abdullah, **M. Abdi-Khorsand**, and K. W. Hedman, "Analyzing the Impacts of Out-of-Market Corrections," *In Proc. of the 2013 IREP Symposium-Bulk Power System Dynamics and Control–IX (IREP),* Rethymnon, Greece, Aug. 2013.

[C6] S. A. H. Bahreyni, **M. Abdi-Khorsand**, and S. Jadid, *"*A Stochastic Unit Commitment in Power Systems with High Penetration of Smart Grid Technologies," *In Proc. of the 2nd Iranian Conference on Smart Electrical Grids (ICSG),* Iran, May 2012.

[C5] **M. Abdi-Khorsand** and H. Heydari, "Joint Stochastic Wind-Thermal Generation Scheduling and Emission Reduction Using Multiobjective Augmented Eps-Constraint Algorithm," *In Proc. of the 6th International Conf. on Technical and Physical Problems of Power Engineering,* Iran, Sep. 2011.

[C4] **M. Abdi-Khorsand**, A. Zakariazadeh, and S. Jadid, "Stochastic Wind-Thermal Generation Scheduling Considering Emission Reduction: A Multiobjective Mathematical Programming Approach," *In Proc. of the Asia-Pacific Power and Energy Engineering Conference*, China, Mar. 2011.

[C3] **M. Abdi-Khorsand** and H. Heydari, "Stochastic Reserve Scheduling for Power System with High Penetration of Wind Power and Interruptible Load Participation Analysis," *In Proc. of the 1st Iranian Conf. on Renewable Energy and Distributed Generation,* Iran, Mar. 2010.

[C2] **M. Abdi-Khorsand**, H. Heydari, and A. Zakariazadeh, "Interruptible Load Participation as Operating Reserve in Joint Energy and Spinning Reserve Markets Using Stochastic Security Analysis," *In Proc. of the 2nd International Conf. on Computer and Automation Engineering,* vol. 5, Singapore, Feb. 2010.

[C1] **M. Abdi-Khorsand** and S. Jadid, "Augmented Z_{bus} Transmission Network Cost Allocation," *In Proc. of the 18th Iranian Conference on Electrical Engineering (ICEE),* Iran, May 2010.

Technical reports:

[T5] **M. Khorsand**, K. W. Hedman, L. Tong, A. Papavasiliou, M. Ghaljehei, J. Kwon, M. Saleh, N. G. Singhal, S. Zhang, and C. Chen, "Newly Implemented and Proposed Market Products and Reformulations: Pricing Implications, Analysis, and Enhancements," PSERC Final Project Report.

[T4] M. He and **M. Khorsand Hedman**, "Enabling and Incentivizing Active Participation of Customers in Smart Grid," Submitted to Salt River Project.

[T3] R. Vakili, P. Chatterjee, **M. Khorsand Hedman**, and Vijay Vittal, "Analyzing the Importance of Modeling Distance Relays in Stability Studies and Development of an Iterative Contingency-based Algorithm to Identify Critical Lines for Modeling Distance Relays," Submitted to Salt River Project.

[T2] M. Chen, V. Vittal, and **M. Khorsand Hedman**, "An Examination of Transmission System Fexibility Metrics," Submitted to Salt River Project.

[T1] V. Vittal, S. Lotfifard, A. Bose, **M. Khorsand**, I. Kiaei, "Representation, Modeling, Data Development and Maintenance of Appropriate Protective Relaying Functions in Large Scale Transient Stability Simulations," PSERC Final Project Report.

Invited conference papers:

[IC1] **M. Abdi-Khorsand** and V. Vittal, "Modeling Protection Systems in Time-Domain Simulations: A New Method to Detect Mis-operating Relays for Unstable Power Swings," *Georgia Institute of Technology Protective Relaying Conference, Clayton Griffin Student Paper Award*, 2017. ***(Best Paper Award)***

Working and under-review papers:

[W5] R. Vakili, **M. Khorsand**, and V. Vittal "Identification of Critical Distance Relays for Transient Stability Analysis," *IEEE Open Access Journal of Power and Energy*, under review.

[W4] Z. Soltani and **M. Khorsand**, "Real Time Topology Detection and State Estimation in Distribution Systems Using Micro-PMU and Smart Meter Data," *IEEE Transactions on Power Delivery*, submitted.

[W3] M. Ghaljehei and **M. Khorsand**, "Day-ahead Resource Scheduling with Enhanced Flexible Ramp Product: Design and Analysis," *IEEE Transactions on Power Systems,* to be submitted by Nov. 2020.

[W2] R. Vakili and **M. Khorsand**, "A Machine Learning-based Approach for Identifying Critical Distance Relays for Transient Stability Studies," *IEEE Transactions on Power Systems,* to be submitted by Dec. 2020.

[W1] M. Esmaili, **M. Khorsand**, and M. He, "Causality Model to Estimate Demand Elasticity of Customers Deeming Socio-Demographic Information," *IEEE Transactions on Smart Grid*, to be submitted by Dec. 2020.

Invited presentations:

[IP6] Mojdeh Khorsand Hedman and Mohammad Ghaljehei "Enhanced Flexible Ramping Product: Design and Analysis," FERC Technical Conference: Increasing Real-Time and Day-Ahead Market Efficiency and Enhancing Resilience through Improve Software, June 2020.

[IP5] Mojdeh Khorsand Hedman, "Data-Enabled Modern Resource Management: From Risk Management to Socially-aware Solutions," Power Systems Engineering Research Center (PSERC) Webinar, Nov. 2019.

[IP4] Mojdeh Khorsand Hedman, "Modeling Protection Systems in Time Domain Simulations, North American Electric Reliability Corporation", System Analysis and Modeling Subcommittee, July 2019.

[IP3] Mojdeh Khorsand Hedman, "Corrective Transmission Switching with *N*-1-1 Contingency Analysis", Institute for Operations Research and the Management Sciences (INFORMS) Conference, Oct. 2019.

[IP2] Mojdeh Khorsand Hedman, "Integrated resource plan docket support: ASU LightWorks", Special Open Meeting of the Arizona Corporation Commission, Stakeholder Meeting and Workshop, Resource Planning and Procurement in 2019, 2020 and 2021; In the Matter of Possible Modification to the Rules on Resource Planning and Procurement, Sep. 2019.

[IP1] Mojdeh Khorsand Hedman, "Developing Tools to Support Urban and Regional Energy

Planning", One-Day Urban and Regional Energy Transitions Workshop, Apr. 2019.

Teaching Experience

- **Resilient Smart Electric Grids, Arizona State University** (Spring 2020)
- **Power Systems Operations and Planning, Arizona State University** (Fall 2017, Fall 2018, Fall 2019, and Fall 2020)
- **Power System Analysis, Arizona State University** (Spring 2018)
- **Electrical Machinery, Azad University, Iran** (Fall 2011, Spring 2012)
- **Circuits Analysis, Azad University, Iran** (Fall 2011, Spring 2012, Spring 2012)
- **Smart Meters and Devices in Smart Grids, Azad University, Iran** (Fall 2011, Spring 2012)

Research Grants

Sponsored projects:

Project Title:	**[Grant 1] Sensor Enabled Modeling of Future Distribution Systems with Distributed Energy Resources**
Agency:	The US Department of Energy, Advanced Research Projects Agency-Energy
Grant Amount:	$3,100,000 (3 Years)
PI:	Vijay Vittal (Arizona State University)
Share:	18% ($558,000)
Co-PIs:	Mojdeh Khorsand Hedman, Raja Ayyanar, Anamitra Pal, Yang Weng (Arizona State University)
Project Period:	September 2019-September 2022

Project Title:	**[Grant 2] Who are controlling the DERs? Increasing DER hosting capacity through targeted modeling, sensing, and control**
Agency:	Power Systems Engineering Research Center (PSERC)
Grant Amount:	$220,000 (2 Years)
PI:	Line Roald (University of Wisconsin–Madison)
Share:	32% ($70,000)
Co-PIs:	Mojdeh Khorsand Hedman (Arizona State University), Daniel Molzahn (Georgia Institute of Technology)
Project Period:	July 2020-August 2022

Project Title:	**[Grant 3] Newly Implemented and Proposed Market Products and Reformulations: Pricing Implications, Analysis, and Enhancements**
Agency:	Power Systems Engineering Research Center (PSERC)
Grant Amount:	$220,000 (2 Years)
PI:	Mojdeh Khorsand (Arizona State University)
Share:	36% ($80,000)
Co-PIs:	Kory Hedman (Arizona State University) and Lang Tong (Cornell University)
Project Period:	July 2018 - August 2020

Project Title:	**[Grant 4] Enabling and Incentivizing Active Participation of Customers in a Smart Grid**
Agency:	Salt River Project (SRP)

Grant Amount:	$57,200
PI:	Mojdeh Khorsand Hedman (Arizona State University)
Share:	100% ($57,200)
Co-PIs:	N/A
Project Period:	August 2018-August 2019

Project Title:	**[Grant 5] Development of a Co-simulation Platform for ASPEN and PSLF to Represent Protective Relaying Functions in Transient Stability Simulations**
Agency:	Salt River Project (SRP)
Grant Amount:	$62,700
PI:	Mojdeh Khorsand Hedman (Arizona State University)
Share:	50% ($31,350)
Co-PIs:	Vijay Vittal (Arizona State University)
Project Period:	August 2018-August 2019

Project Title:	**[Grant 6] An Examination of Transmission System Flexibility Metrics**
Agency:	Salt River Project (SRP)
Grant Amount:	$62,700 ($31,350)
PI:	Vijay Vittal (Arizona State University)
Share:	50% ($31,350)
Co-PIs:	Mojdeh Khorsand Hedman (Arizona State University)
Project Period:	August 2018-August 2019

Project Title:	**[Grant 7] Arizona Corporation Commission: Energy Modeling Tool Development**
Agency:	Arizona Corporation Commission, TRIF
Grant Amount:	$95,000
PI:	Gary Dirks (Arizona State University)
Share:	100% ($95,000)
Co-PIs:	Mojdeh Khorsand Hedman (Arizona State University)
Project Period:	March 2019-June 2020

Pending research proposals:

Project Title:	**[Proposal 1] Control and Optimization of Hybrid PV Plus Storage Plants with a Network of Grid Forming Inverters**
Agency:	The Department of Energy, Solar Energy Technologies Office
Grant Amount:	$ 4,000,000
PI:	Raja Ayyanar (Arizona State University)
Share:	30% ($1,200,000)
Co-PIs:	Mojdeh Khorsand Hedman and Vijay Vittal (Arizona State University), Electric Power Research Institute (EPRI), Salt River Project (SRP), and Open Systems International (OSI)
Project Period:	2021-2024

Project Title:	**[Proposal 2] Day-Ahead Net-Load Forecast Model to Mitigate Demand and**

	Distributed Solar Generation Uncertainties
Agency:	The US Department of Energy, Solar Energy Technologies Office
Grant Amount:	$750,000
PI:	Sara Eftekharnejad (Syracuse University)
Share:	27% ($200,000)
Co-PIs:	Reza Zafarani (Syracuse University), Mojdeh Khorsand Hedman (Arizona State University), Frank Monforte (Itron), and Sean K. Sullivan (Avangrid)
Project Period:	2021-2024

Project Title:	**[Proposal 3] Who are controlling the DERs? Increasing DER hosting capacity through targeted modeling, sensing, and control**
Agency:	NASA
Grant Amount:	$2,000,000 (2 Years)
PI:	Rajapandian Ayyanar (Arizona State University)
Share:	30% ($600,000)
Co-PIs:	Mojdeh Khorsand Hedman and Qin Lei ((Arizona State University), Ravi Gorur (University of Alabama), Sudipta Chakraborty (Opal-RT Corporation), and Devarajan Srinivasan (Poundra LLC)
Project Period:	2021-2023

Project Title:	**[Proposal 4] A Predictive Outage Framework for Prescriptive Risk Management and Mitigation Measures to Enhance the Grid Reliability during General Storms**
Agency:	Power Systems Engineering Research Center (PSERC)
Grant Amount:	$150,000 (2 Years)
PI:	Mojdeh Khorsand Hedman (Arizona State University)
Share:	53% ($80,000)
Co-PIs:	Mladen Kezunovic (Texas A&M University)
Project Period:	2021-2023

Selected declined research proposals:

Project Title:	**[Proposal 1] Power4Professionals**
Agency:	The US Department of Energy, Office of Energy Efficiency and Renewable Energy (EERE)
Grant Amount:	$6,000,000 (4 Years)
PI:	Mojdeh Khorsand Hedman
Share:	40%
Co-PIs:	Stephen Phillips, Yang Weng, Oliver Kosut, Robin Podmore
Project Title:	**[Proposal 2] SCC-IRG Track 2: Powering Communities in the Era of Energy Democracy: Incentivizing Efficient Adoption of Smart Electric Grid Technologies across Social Classes**
Agency:	National Science Foundation
Grant Amount:	$1,487,893
PI:	Mojdeh Khorsand Hedman (Arizona State University)
Share:	35% ($520,763)

Co-PIs:	Adolfo Escobedo, Ross Maciejewski, Clark Miller, Lauren Keeler (Arizona State University)
Project Period:	2020-2023

Project Title:	**[Proposal 3] CPS: TTP Option: Medium: The Assured Volt-Ampere Information Ledger (AVAIL): A Blockchain Technology for Sharing Sensitive Data in Power Systems**
Agency:	National Science Foundation
Grant Amount:	$1,000,000 (3 Years)
PI:	Anna Scaglione
Share:	25%
Co-PIs:	Mojdeh Khorsand Hedman, Kory Hedman, Rida Bazzi
Project Title:	**[Proposal 4] Cybersecure Data Analytics Platform for Enhanced Coordination of Interdependent Electric Energy and Natural Gas Systems**
Agency:	The US Department of Energy (DOE)
Grant Amount:	$2,499,999 (3 Years)
PI:	Junshan Zhang
Share:	20%
Co-PIs:	Mojdeh Khorsand Hedman, Yang Weng, Vijay Vittal

Professional Activities and Services

Referee:

- Reviewer for IEEE Transactions on Power Systems
- Reviewer for IEEE Transactions on Sustainable Energy
- Reviewer for IET Generation, Transmission & Distribution
- Reviewer for IEEE Transactions on Smart Grid
- Reviewer for IEEE Systems Journal
- Reviewer for Journal of Renewable and Sustainable Energy

Member:

- IEEE
- INFORMS
- IEEE Power and Energy Society (PES)
- IEEE PES Women in Power
- IEEE PES Task Force on Integrating Relay Models in Electromechanical Simulations
- IEEE PES ASU Student Branch Chapter, Faculty Advisor

Conference and Meeting Organization:

- Chair of organizing committee for the 52nd North American Power Symposium
- Member of Technical Organizing Committee of Lunar Surface Innovation Consortium (LSIC) Fall Meeting 2020: LSIC operates in collaboration with the NASA Space Technology Mission Directorate under the Lunar Surface Innovation Initiative
- IEEE PES General Meeting Panel Session Chair: DER-enabled and Sensor-enabled Active Distribution System Management, 2021
- IEEE PES General Meeting Panel Session Chair: Flexibility Requirements and Procurements: Resource Evolution and Emerging Market Products, 2021

- IEEE PES General Meeting Panellist: Integrating Relay Models with RMS Dynamic Simulations, 2021
- Session chair: Machine Learning Applications, Emerging Topics Track, NAPS 2019
- Organizing IEEE PES Phoenix Chapter and ASU joint luncheon: 2018 and 2019

ASU Committee:

- New Faculty Advisory Council, committee member, Arizona State University: 2017-2019
- Financial and infrastructure committee, School of Electrical, Computer, and Energy Engineering, Arizona State University

Other Services:

- Volunteer at Arizona Science Lab (a non-profit affinity group of the IEEE Phoenix Section; ASL educates 4-9th grade students on STEM and targets Title 1 schools)

Awards and Honors

- Clayton Griffin Paper Award, Georgia Institute of Technology Protective Relaying Conference, May 2017.
- IEEE PES Phoenix Chapter Graduate Power Engineering Scholarship, March 2016.
- IEEE Phoenix Section Student Scholarship, January 2016.
- University Graduate Fellowship, Arizona State University, 2012.

Advising Students

Ph.D. Students Current:

- Mohammad Ghaljehei, expected Spring 2022
- Zahra Soltani, expected Spring 2022
- Ramin Vakili, expected Spring 2022
- Mingyue He, expected Spring 2023

Current Post-doc Mentoring:

- Dr. Masoud Esmaili

Students Graduated:

- Yingying Wang, PhD, Spring 2020
- Byeongdoo Jeon, MS, Spring 2020
- Mingyue He, MS, Fall 2019