# Himanshu Jain

*Academic CV*

*Roorkee, India*
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## Education

2016 **Ph.D., Electrical Engineering**, *Virginia Tech*, Blacksburg, VA, USA
GPA: 4.0/4.0. Advisor: Dr. Robert Broadwater
*Dissertation:* Dynamic Simulation of Power Systems using Three Phase Integrated Transmission and Distribution System Models: Case Study Comparisons with Traditional Analysis Methods

2010 **M.S., Electrical Engineering**, *University of Texas at Arlington*, Arlington, TX, USA
GPA: 4.0/4.0. Advisor: Dr. Wei-Jen Lee
*Thesis:* Detection and Severity Classification of Rotor Imbalance Faults in Induction Machines

2008 **B.Tech., Electrical Engineering**, *G.B. Pant University of Agriculture and Technology*, Pantnagar, India
GPA: 9.0/10.0

## Research Interests

- Grid reliability and resilience under very-high variable renewable energy penetration
- Black start of bulk power and distribution systems using inverter-based generation resources
- Increasing grid flexibility from demand side resources and energy storage
- Cyber-physical systems modeling of distribution systems with high levels of DERs
- New algorithms and tools for accurate modeling of power grids under very-high renewable penetration

## Academic and Professional Experience

2026–Present **Coordinator**, *Centre for Regulatory Affairs, IIT Roorkee*, Roorkee, India
Newly established centre through seed fund of Rs. 5 crore by the Forum of Regulators to support development of evidence based regulations in India

2021–Present **Assistant Professor**, *Department of Hydro and Renewable Energy, IIT Roorkee*, Roorkee, India
Advising topics: power system stability under high levels of renewable energy; grid services from Behind-the-Meter DERs; multi-timescale load modeling; cyber-physical systems; wireless EV charging.

2020–2021 **Senior Research Engineer**, *National Renewable Energy Laboratory (NREL)*, Golden, CO, USA
PI for projects & tasks worth $1.9M (INR 1672 Lakhs); secured R&D funding; mentored engineers and interns.

2017–2020 **Research Engineer**, *National Renewable Energy Laboratory (NREL)*, Golden, CO, USA
Modeled transmission, distribution, and integrated T&D systems across time scales to analyze impacts of high VRE penetration.

2015 **Summer Intern**, *National Renewable Energy Laboratory (NREL)*, Golden, CO, USA
Developed Multi-Area Frequency Response Integration Tool (MAFRIT) for simulating frequency response of power systems.

2012–2013 **Senior Associate**, *ICF International*, Fairfax, VA, USA
Led distribution feeder modeling capability development; conducted and led power system reliability studies.

2011–2012 **Associate**, *ICF International*, Fairfax, VA, USA
Conducted transmission system power flow analysis; evaluated impact of policies and regulations on renewable energy development and transmission expansion.

## Teaching

Undergraduate (Average Faculty Score: **4.43/5.00**)

2024–2025 **HRC-101: Computer Programming** (offered twice)

2021-2024 **IHR/IAH-301: Small Hydro Power Development** (multiple offerings)

Postgraduate (Average Faculty Score: **4.80/5.00**)

2021–2025 **HRE-514/HRL-511: Hydro Electric Equipment** (multiple offerings)

2022–2025 **HRE-583/HRC-505: Grid Integration of Renewable Energy** (multiple offerings).

2025 **HRL-527: Advanced Modelling for Renewable Energy Power Systems**

2021, 2024 **AHN/HRE-528: Rural Electrical Energy System Planning and Design** (offered twice)

2022, 2023 **AHN/HRE-513: Renewable Energy Resources Development Technology** (offered twice)

## PhD Thesis Supervision

2023 Arun Sharma, Investigations on Hydraulic Short Circuit and Mode Change Operations of Fixed Speed Pump Storage Power Plants. (part-time; co-supervisor - Prof. S.K. Singal)

2023 Trilok Nath Tiwari, Grid interactive buildings for a cleaner power grid. (part-time; co-supervisor - Prof. E. Rajasekar)

2022 Sruthi M P, Grid Forming Applications of Variable Speed Pumped Storage Hybrid Power Plant. (part-time)

2022 Zarka Mirza, Design And Control of Inverter-Based Loads for Improving Power System Stability Under High Levels of Renewable Energy. (full time)

2022 Amit Kumar, Development of a Framework for Cyber Physical Modelling of Electric Distribution Systems (full time).

2021 Harshit Varshney, Development of load models using System Identification (**PMRF fellow, pre-submission completed**). (full time)

2021 Priyanka Tiwari, Wireless Charging Systems for Electric Transportation Applications. (full time)

## Masters Thesis Supervision

ongoing Harsh Soni, Co-Simulation Approach to Simulate Power Systems with High Levels of Renewable Energy Using HELICS.

ongoing Sneha Kumari, A Battery Storage Sizing Tool for Buildings.

ongoing Sanjay Sah, Planning the Power Grid for High Renewable Energy Future.

2025 Mohammed Farshid K, Grid-Forming Inverters for Reliability and Resilience.

2025 Issa Stephan Mlimbila, Cyber Modelling for Smart Distribution Systems.

2024 Avnish Yadav, Real-Time Pumped Storage Hydro Plant Simulator.

2024 Balbeer Singh Chauhan, A Campus Distribution System Planning Framework for High Levels of Transport Electrification.

2024 Urvi Singh, Resilient Distribution System using Grid Forming Inverters.

2024 Vartika Dubey, Modelling of Energy Storage for Power System Planning and Operations.

2024 Siddhant Mishra, Model based estimation of Demand Flexibility Potential: A case study of urban feeder in India. (co-supervisor - Shri Pramod Singh)

2024 Govind, Study of Fuel Cell Electric Vehicles with Supercapacitors.(co-supervisor - Prof. Amit Bhosale)

2023 Mohammad Alam, Effect of SPV System on Distribution Grid of IIT Roorkee. (co-supervisor - Prof. Rhythm Singh)

2023 Anish Kumar Abishek, Improved Pumped Storage Models for Power System Planning.

2023 Vikash Kumar Das, Design and Analysis of Resilient Distribution Systems.

2022 Ravi Tiwari, Thermal-Electric Modelling for Investigating Impacts of CVR Programs on Energy Consumption of Air-Conditioning and Refrigeration Loads.

## Curriculum Development, Teaching Innovation, and Lab Development

Innovation
- Real-time Digital SHP Simulator Instructional Video
- Physical Model for explaining Solar Angles

- Introduced GE-PSLF, PowerWorld, OpenDSS, MATLAB/Simulink, GAMS, FESTIV, ReOpt in courses

New Courses
- HRE-583/HRC-505 (Grid Integration of Renewable Energy)
- HRE-587/HRL-527 (Advanced Modelling for Renewable Energy Power Systems)
- HRE-584/HRC-509 (Finance, Policy and Regulations for Renewable Energy, with Prof. Arun Kumar)
- Several UG course structures for B.Tech in Energy Engineering
- Revised OEC HRO-101 (Small Hydro Power Development) with Prof. Sunil Singal

New Labs
- Renewable Grid Integration Laboratory (inaugurated May 2023)
- State-of-the-art modular electric machines setup procured through CSR grant from NTPC
- Redesign and redevelopment of electrical lab
- Operationalized Opal-RT real-time simulator that was unused since 2019

## Publications Summary (Total citations: 870; i-10 index: 18; h-index: 13)

### Journal Publications

2025 [1] Z. Mirza and **H. Jain** *(corresponding author)*, "From challenges to solutions: Review and analysis of grid-supportive technologies in sustainable power systems," *Applied Energy*, vol. 403, pt. B, p. 127111, 2026.*DOI*: 10.1016/j.apenergy.2025.127111. (**I.F. - 11.0**)

2025 [2] Z. Mirza and **H. Jain** *(corresponding author)*, "Automated Fast Frequency Response From Inverter-Based Motor Loads," *IEEE Trans. Smart Grid*, vol. 16, no. 4, pp. 2940–2952, Jul. 2025.*DOI*: 10.1109/TSG.2025.3569419. (**I.F. - 9.8**)

2025 [3] H. Varshney and **H. Jain** *(corresponding author)*, "Developing dynamic models of inverter-based motor loads using active probing-based system identification techniques," *Electr. Power Syst. Res.*, vol. 248, p. 111906, 2025.*DOI*: 10.1016/j.epsr.2025.111906. (**I.F. - 4.2**)

2025 [4] A. Singhal, P. Arora, A. Kumar, **H. Jain**, A. K. Sharma, A. C. Bhosale, R. Singh, S. K. Saini, D. Rakshit, A. K. S. Parihar, and S. Arora, "Integrated life cycle assessment and techno-economic analysis of grid-scale energy storage alternatives for India," *Sustainable Production and Consumption*, vol. 54, pp. 404–422, Mar. 2025.*DOI*: 10.1016/j.spc.2025.01.011. (**I.F. - 9.6**)

2024 [5] J. Cochran, P. Denholm, M. Mooney, D. Steinberg, E. Hale, G. Heath, B. Palmintier, D. Keyser, D. Oleson, D. Arent, H. Horsey, A. Fontanini, M. Muratori, J. Jorgenson, V. Ravi, B. Cowiastoll, B. Sigrin, K. Horowitz, **H. Jain**, M. Irish, S. Nicholson, G. Ban-Weiss, and H. Cutler, "Integrated multimodel analysis reveals achievable pathways toward reliable, 100% renewable electricity for Los Angeles," *Cell Reports Sustainability*, Jun. 2024.

2022 [6] **H. Jain** *(corresponding author)*, B. Mather, A. K. Jain, and S. F. Baldwin, "Grid-Supportive LoadsA New Approach to Increasing Renewable Energy in Power Systems," *IEEE Trans. Smart Grid*, vol. 13, no. 4, pp. 2959–2972, Jul. 2022.*DOI*: 10.1109/TSG.2022.3153230. (**I.F. - 9.8**)

2023 [7] H. Varshney, **H. Jain** *(corresponding author)*, and R. Tiwari, "Thermal-Electric Modeling: A New Approach for Evaluating the Impact of Conservation Voltage Reduction on Cooling Equipment," *Buildings (MDPI)*, vol. 13, no. 5, 2023. (**I.F. - 3.1**)

2022 [8] R. Chakraborty, **H. Jain**, and G.-S. Seo, "A review of active probing-based system identification techniques with applications in power systems," *Int. J. Electr. Power & Energy Syst.*, vol. 140, p. 108008, 2022.*DOI*: 10.1016/j.ijepes.2022.108008. 2023. (**I.F. - 5.0**)

2021 [9] **H. Jain**, B. Bhatti, T. Wu, B. Mather, and R. Broadwater, "Integrated Transmission-and-Distribution System Modeling of Power Systems: State-of-the-Art and Future Research Directions," *Energies (MDPI)*, 2021. (**I.F. - 3.2**)

2020 [10] A. K. Jain, K. Horowitz, F. Ding, K. S. Sedzro, B. Palmintier, B. Mather, and **H. Jain**, "Dynamic Hosting Capacity Analysis for Distributed Photovoltaic ResourcesFramework and Case Study," *Applied Energy*, 2020. (**I.F. - 11.0**)

2020 [11] B.-M. S. Hodge, **H. Jain**, C. Brancucci, G.-S. Seo, M. Korpås, J. Kiviluoma, H. Holttinen, J. C. Smith, A. Orths, A. Estanqueiro, L. Söder, D. Flynn, T. K. Vrana, R. W. Kenyon, and B. Kroposki, "Addressing Technical Challenges in 100% Variable Inverter-Based Renewable Energy Power Systems," *Wiley Interdisciplinary Reviews: Energy and Environment*, e376, pp. 1–19, 2020. (**I.F. - 6.0**)

2017 [12] **H. Jain**, R. P. Broadwater, M. Dilek, and J. Bank, "Studying the Impact of Solar PV on Power System Dynamics Using Integrated Transmission & Distribution Network Models," *Journal of Energy Engineering (ASCE)*, vol. 144, no. 1, 2017. (**I.F. - 1.8**)

2017 [13] T. Baileh, **H. Jain**, R. Broadwater, J. Cordova, R. Arghandeh, and M. Dilek, "Graph Trace Analysis: An Object-Oriented Power Flow, Verifications and Comparisons," *Electric Power Systems Research*, vol. 147, pp. 145–153, 2017. (**I.F. - 4.2**)

2016 [14] **H. Jain**, A. Parchure, R. P. Broadwater, M. Dilek, and J. Woyak, "Three-Phase Dynamic Simulation of Power Systems Using Combined Transmission and Distribution System Models," *IEEE Transactions on Power Systems*, vol. 31, no. 6, pp. 4517–4524, Nov. 2016. (**I.F. - 7.2**)

### Patent

2025 [15] Z. Mirza, and **H. Jain**, *Automated Fast Frequency Response Controller for Inverter-Based Motor Loads*, Indian Patent Application 202511045056, Filed May 9, 2025 (published and awaiting examination).

### Conference Publications

2025 [16] H. Varshney and **H. Jain**, "A System Identification Approach for Developing Dynamic Models of Inverter-Based Motor Loads," *Proc. IEEE Int. Conf. Energy Technologies for Future Grids*, Wollongong, Australia, Dec. 7–11, 2025.

2025 [17] S. M. Pathayapurayil and **H. Jain**, "Modelling and Dynamic Analysis of a Multi Megawatt Pumped Storage Plant Operating as Virtual Synchronous Generator," *Proc. IEEE Int. Conf. Energy Technologies for Future Grids*, Wollongong, Australia, Dec. 7–11, 2025.

2025 [18] M. Farshid K and **H. Jain**, "A Comparative Study of Grid Forming Inverter Controls and Their Applications for Improving Resilience of Distribution Systems," *Proc. IEEE Int. Conf. Power Electronics, Smart Grid, and Renewable Energy (PESGRE)*, Dharwad, India, Dec. 18–21, 2025.

2025 [19] A. Kumar, I. S. Milimbila, and **H. Jain**, "Cyber Modelling of Advanced Metering Infrastructure using ns-3," *Proc. IEEE Int. Conf. Power Electronics, Smart Grid, and Renewable Energy (PESGRE)*, Dharwad, India, Dec. 18–21, 2025.

2025 [20] P. Tiwari and **H. Jain**, "Performance Sensitivity of Inductive Wireless Charging Systems with Tapped Coils," *Proc. IEEE Transportation Electrification Conf. Asia-Pacific (ITEC Asia-Pacific)*, Singapore, Nov. 25–28, 2025.

2025 [21] M. S. Aziz, X. Zhou, D. Robinson, S. S. Energy, **H. Jain**, and Z. Ma, "Grid-to-Building Interactions through Digital Twin and Open DSS Integration: Co-Simulation," *Proc. IEEE 13th Int. Conf. Smart Energy Grid Engineering (SEGE)*, Oshawa, ON, Canada, 2025, pp. 133–137, doi: 10.1109/SEGE65970.2025.11203704.

2024 [22] A. Kumar and **H. Jain**, "Timing & Synchronization of Hierarchical Engine for Large-scale Infrastructure Co-Simulation (HELICS): A Case Study," *Proc. 8th Int. R&D Conf. Global Trends in Water, Power and RE Technologies*, Roorkee, India, 2024.

2024 [23] V. Dubey and **H. Jain**, "Modelling Energy Storage System for Power System Planning and Operations," *Proc. 8th Int. R&D Conf. Global Trends in Water, Power and RE Technologies*, Roorkee, India, 2024.

2024 [24] U. Singh and **H. Jain**, "Resilient Distribution System using Grid Forming Inverters," *Proc. 8th Int. R&D Conf. Global Trends in Water, Power and RE Technologies*, Roorkee, India, 2024.

2023 [25] P. Patidar and **H. Jain**, "Design of Horizontally Aligned Six-Plate Capacitive Power Transfer for EV Charging Applications," *Proc. IEEE Transportation Electrification Conf. Asia-Pacific (ITEC Asia-Pacific)*, Chiang Mai, Thailand, 2023.

2023 [26] A. Kumar and **H. Jain**, "A Framework for Cyber-Physical Simulation of Smart Grid," *Proc. 1st Int. Conf. Cyber Physical Systems, Power Electronics and Electric Vehicles (ICPEEV)*, Hyderabad, India, 2023.

2023 [27] Z. Mirza and **H. Jain**, "Implementing Grid Supportive Behavior in Induction Motor-Driven Loads using Field Oriented Control," *Proc. IEEE PES GT&D Int. Conf. and Exposition*, Istanbul, Turkey, 2023.

2023 [28] S. M. Pathayapurayil and **H. Jain**, "Variable Speed Pumped Storage Hydropower Plant for Black Start," *Proc. IEEE Int. Conf. Energy Technologies for Future Grids (ETFG)*, Wollongong, Australia, 2023.

2022 [29] A. Banerjee, A. Pandey, U. R. Pailla, G.-S. Seo, S. Shekhar, **H. Jain**, Y. Lin, X. Wu, J. Bamberger, and U. Muenz, "Autonomous Microgrid Restoration Using Grid-Forming Inverters and Smart Circuit Breakers," *Proc. IEEE Power and Energy Society General Meeting*, Denver, CO, USA, 2022.

2022 [30] H. Tiwari and **H. Jain**, "Investigating Impact of Conservation Voltage Reduction (CVR) on Efficiency of Air-Conditioning and Refrigeration Loads," *Proc. Int. Conf. Hydro and Renewable Energy Net Zero Carbon Energy Systems*, Roorkee, India, 2022.

2022 [31] M. Kumar, S. Sen, **H. Jain**, and S. Diwania, "Optimal Planning for Building Integrated Microgrid System (BIMGS) for Economic Feasibility with Renewable Energy Support," *Proc. IEEE 10th Power India Int. Conf. (PIICON)*, New Delhi, India, 2022.

2020 [32] **H. Jain**, G. Seo, E. Lockhart, V. Gevorgian, and B. Kroposki, "Black Start of Power Grids with Inverter-based Resources," in *Proc. IEEE Power and Energy Society General Meeting (PESGM)*, Virtual Meeting, 2020.

2020 [33] **H. Jain**, et al., "Quantifying Solar PV Variability at Multiple Timescales for Power Systems Studies," in *Proc. 47th IEEE Photovoltaic Specialists Conference (PVSC)*, Virtual Meeting, 2020.

2019 [34] **H. Jain**, B. Palmintier, D. Krishnamurthy, I. Krad, and E. Hale, "Evaluating the Impact of Price-Responsive Load on Power Systems Using Integrated T&D Simulation," in *Proc. IEEE Innovative Smart Grid Technologies (ISGT)*, Washington, DC, 2019.

2019 [35] R. S. Biswas, J. Tan, **H. Jain**, V. Gevorgian, and Y. Zhang, "Equivalent Test Bed in PSCAD and PSLF for Studying Advanced Power Systems Controller Performance," in *Proc. IEEE ISGT*, Washington, DC, 2019.

2018 [36] **H. Jain**, B. Palmintier, I. Krad, and D. Krishnamurthy, "Studying the Impact of Distributed Solar PV on Power Systems Using Integrated Transmission and Distribution Models," in *Proc. IEEE/PES Transmission & Distribution Conference and Exposition (T&D)*, Denver, CO, 2018.

2016 [37] K. Rahimi, **H. Jain**, and R. Broadwater, "Application of Distributed Series Reactors in Relieving Congestion Costs," in *Proc. IEEE/PES T&D Conference and Exposition*, Dallas, TX, 2016.

2016 [38] **H. Jain**, K. Rahimi, A. Tbaileh, R. P. Broadwater, A. K. Jain, and M. Dilek, "Integrated Transmission & Distribution System Modeling and Analysis: Need & Advantages," in *Proc. IEEE Power and Energy Society General Meeting (PESGM)*, Boston, MA, 2016.

2015 [39] **H. Jain**, A. Parchure, R. P. Broadwater, M. Dilek, and J. Woyak, "Three Phase Dynamics Analyzer: A New Program for Dynamic Simulation Using Three Phase Models of Power Systems," in *Proc. IEEE IAS Joint Industrial and Commercial Power Systems / Petroleum and Chemical Industry Conference (ICPSPCIC)*, Hyderabad, 2015.

2015 [40] K. Rahimi, **H. Jain**, R. Broadwater, and J. Hambrick, "Application of Distributed Series Reactors in Voltage Balancing," in *Proc. IEEE Power & Energy Society General Meeting (PESGM)*, Denver, CO, 2015.

2014 [41] **H. Jain**, K. Kumaraswamy, and R. N. Maurya, "Plug-In Electric VehiclesDistribution System Impacts and High-Level Screening Methodologies for Calculating Costs and Benefits," in *Proc. IEEE Innovative Smart Grid Technologies (ISGT)*, Washington, DC, 2014.

2010 [42] **H. Jain**, S. Korkua, W. Lee, and C. Kwan, "Detection and Severity Classification of Rotor Imbalance Faults in Induction Machines," in *Proc. IEEE Industry Applications Society Annual Meeting*, Houston, TX, 2010.

2010 [43] S. Korkua, **H. Jain**, W. Lee, and C. Kwan, "Wireless Health Monitoring System for Vibration Detection of Induction Motors," in *Proc. IEEE Industrial and Commercial Power Systems Technical Conference*, Tallahassee, FL, 2010.

### Technical Reports

2023 [44] Arun Kumar, Pratham Arora, **Himanshu Jain**, Ashwini Kumar Sharma, Amit Bhosale, Dibakar Rakshit, and Rhythm Singh, "Advanced grid-scale energy storage technologies".

2022 [45] Arun Kumar and **Himanshu Jain**, "Study for Feasibility for Pump mode operation of Kadana Hydropower plant ," for the Gujarat State Electricity Corporation Limited.

2021 [46] K. Ardani, et al., "Solar Futures Study," for the US Department of Energy, USA (Contributed to Chapter titled "Reliably Integrating More than a Terawatt of Solar onto the Grid").

2021 [47] Jaquelin Cochran, Paul Denholm, Meghan Mooney, Daniel Steinberg, Elaine Hale, Garvin Heath, Bryan Palmintier, Ben Sigrin, David Keyser, Devonie McCamey, Brady Cowiestoll, Kelsey Horowitz, Henry Horsey, Anthony Fontanini, **Himanshu Jain**, Matteo Muratori, Jennie Jorgenson, Matt Irish, George Ban-Weiss, Harvey Cutler, Vikram Ravi, and Scott Nicholson , "LA100: The Los Angeles 100% Renewable Energy Study," for the Los Angeles Department of Water and Power, CA, USA.

## Awards

2025 Received Director's letter of Appreciation for outstanding performance for the Annual Performance Appraisal Report of AY23-24.

2024 Placed in top 5 faculty at IIT Roorkee in the categories of (i) Post Graduate (PG 10 or more students) and (ii) Post Graduate Young Faculty (PG 10 or more students) in AY23-24.

2020 NREL Outstanding Mentor Award (2020).

2019 NREL President's Award for research funding exceeding $1M (2019).

2019 R&D100 Awards finalist as part of HELICS team (2019).

2018 ASCE Outstanding Reviewer, Journal of Energy Engineering (2018).

2012 ICF Certificate of Recognition (2012).

2009 Vice Chancellors Gold Medal (B.Tech), 2009.

## Research Projects and Funding

2026–present • PI - *Development of a Real Time PSP Simulator for Pumped Storage Plants*; sponsor: NHPC Ltd., **INR 603 Lakhs**.

2025–present • PI - *Towards Automatic Blackstart of Smart Distribution Systems using Inverter-based Resources*; collaborators: CPRI, sponsor: CPRI, **INR 110 Lakhs**.

2025–present • PI from IITR - *Investigation of Wide-Area Simulation Frameworks for Renewable Energy and HVDC Systems to accurately capture their Dynamic Behavior; collaborators*: IIT Bombay (lead), IISc, IIT Indore, sponsor: Grid Controller of India, **INR 72 Lakhs** (IITR share INR 17 Lakhs).

2025–present • Co-PI - *Scaling up Floating Solar Photovoltaic Systems*, sponsor: ISEF, USA, **INR 23 Lakhs** (USD 27,418).

2024–present • Co-PI - *Paving the way forward for PSP development*, Prof. Arun Kumar (PI), sponsor: ISEF (USA), **INR 134 Lakhs** (USD 152,496).

2024–2025 • PI - *Optimization Studies for Hydropower Stations in Cascade for River Jhelum in J&K*, sponsor: Grid Controller of India, **INR 22 Lakhs**.

2024–2025 • Co-PI *USAID/India Higher Education Partnership for Disaster Resilient Infrastructure (HEP-DRI)*, sponsor: USAID, **INR 550 Lakhs** (USD 625,000) (project ended by USAID in 2025)

2022–2023 • Co-PI *Development of National Scheme for Advanced grid-scale energy storage technologies*; Prof. Arun Kumar (PI), Sponsor: New Venture Fund, **INR 83 Lakhs** (USD 100,000)

2021–2023 • PI from IITR - *Machine Learning-based Dynamic Climate Projections for Power System Planning Datasets*; collaborators: University of Colorado Boulder (lead), sponsor: Climate Change AI, 118 Lakhs (USD 135,000) (IITR share **INR 18 Lakhs**).

2021–2025 • PI *Multi-timescale Electrical Models of Buildings with high levels of Distributed Energy Resources*, sponsor: IITR, **INR 20 Lakhs**.

2020–2021 • PI *Black start using Inverter-Based Resources*, sponsor: NREL, **INR 264 Lakhs** (USD 300,000).

2019–2021 • PI from NREL DOE SETO (NREL) - *Grid services from Behind-the-meter DERs*, sponsor: US Department of Energy, **INR 704 Lakhs** (USD 800,000).

2018–2021 • Co-PI (lead for power flow and stability task) - *The Los Angeles 100% Renewable Energy Study (LA100 Study)*, sponsor: Los Angeles Department of Water and Power (LADWP, USA), **INR 704 Lakhs** (USD 800,000).

## Sponsored Consultancy Projects

2025–2026 • PI - *Capacity Building Programme on Hydropower and PSP for officials of Druk Green Power Corporation Ltd., Bhutan*, sponsor: Druk Green Power Corporation Ltd., Bhutan, **INR 51 Lakhs**

2025–present • PI - *Empanelment for consultancy services*, sponsor: Central Electricity Regulatory Commission (CERC)

2024–present • Co-PI - *Engagement for strategic evaluation of hydropower*, Prof. Arun Kumar (PI), sponsor: ITC Ltd., **INR 9 Lakhs**

2025 • PI - *Capacity Enhancement Program on PSP*, sponsor: Adani Green Energy Ltd., **INR 15 Lakhs**.

2024–2025 • PI - *Support the Development of Pumped Storage Hydropower Plants in India*, sponsor: Idam Infrastructure, **INR 14 Lakhs**.

2024–2025 • PI - *Optimum utilisation of Indian Railways (IR) Rooftop Solar (RTS) assets by integrating this with Auxiliary transformer traction supply of Indian Railways*, sponsor: Netision Techlogy LLP, **INR 12 Lakhs**.

2024–2025 • Co-PI - *Support the scaling up of Pumped Storage Plants (PSP) in India*, Prof. Arun Kumar (PI), sponsor: Netision Techlogy LLP, **INR 34 Lakhs**

2024–2025 • Co-PI - *Development of Masters Elective Courses on New and Innovative Solar Applications*, Prof. Rhythm Singh (PI), sponsor: GiZ, **INR 30 Lakhs**

## Sponsored Short-Term Training Programs

2025 • PI - *Pumped Storage Projects*, sponsor: Bhakra Beas Management Board, **INR 9 Lakhs**.

2025 • PI - Nav-Urja Nirman: Building a Future in Renewable Energy - Phase I&II, sponsor: Indian Oil Corporation Ltd., **INR 45 Lakhs**.

2025 • Co-PI - Regulatory framework and operation of RE generation resources, sponsor: NHPC Ltd., **INR 9 Lakhs**

2025 • Co-PI - Latest Innovations in Energy Storage including PSPs & BESS, sponsor: NHPC Ltd., **INR 9 Lakhs**

2025 • PI - *Renewable Energy and Challenges of Integration with the Grid*, sponsor: NHPC Ltd., **INR 9 Lakhs**

2024 • PI - *Key Drivers for Hydropower and measures for reduction in Cost & Tariff of Hydro Power for its viability in current scenario of High penetration of Renewable Energy*, sponsor: NHPC Ltd., **INR 7 Lakhs**.

2024 • PI - *Pumped Storage Projects inception to commissioning*, sponsor: NHPC Ltd., **INR 9 Lakhs**.

2024 • PI - *Innovative Concepts in Energy Storage Systems*, sponsor: NHPC Ltd., **INR 8 Lakhs**.

2023 • PI - *Impact on Grid due to high Penetration of Renewable Energy*, sponsor: NHPC Ltd., **INR 8 Lakhs**.

2023 • Co-PI - *Pumped Storage Plant*, sponsor: Gujarat Energy Training & Research Institute, **INR 10 Lakhs**.

2023 • PI - *Renewable Energy & Challenges of integration with the grid*, sponsor: Gujarat Energy Training & Research Institute, **INR 7 Lakhs**.

2023 • Co-PI - *Keys Drivers for Hydropower and Measures for Reduction in Cost & Tariff of Hydro Power*, sponsor: NHPC Ltd., **INR 8 Lakhs**.

2023 • PI - *Pumped Storage Projects*, sponsor: Water Resources Department, Govt. of Maharashtra, **INR 8 Lakhs**.

2022 • PI - *Impact on Grid Due to High Penetration of Renewable Energy*, sponsor: NHPC Ltd., **INR 7 Lakhs**.

2021 • Co-PI - *Regulatory Process for Cost Reflective Tariff Design*, sponsor: USAID, **INR 9 Lakhs**.

2021 • Co-PI - *Small, Mini and Micro Hydro Power Generation*, sponsor: SAARC Energy Centre, **INR 5 Lakhs**.

## Administrative Responsibility and Leadership

### Outside Institute

2025–present Member of working group on Grid-Forming Inverters setup by the Central Electricity Authority, Ministry of Power, Government of India

2024–present Editorial board member of the Scientific Reports journal

2015–present Reviewer for several journals including IEEE Transactions on Power Systems, IEEE Transactions on Smart Grid, Renewable Energy, Applied Energy, IEEE Transactions on Power Delivery, IET Generation, Transmission, and Distribution, Scientific Reports, and others

2025 Review committee member for the conference and moderator for the panel on The Road to Grid Resilience: Embracing Demand Flexibility to Power and Decarbonize India's Future at the Energise 2025 conference

2025 Organized study tour of electricity regulators to Germany sponsored by the Forum of Regulators

2024–2025 Member of the committee of the Central Electricity Authority, Ministry of Power, Government of India to per-form techno economic analysis for replacing Diesel Gensets at the Sewa Bhawan building with battery energy storage

2023–2025 Member of the sectional committee WRD 29 (Small Hydropower Plants), Bureau of Indian Standards (BIS)

2024 Member of the organizing committee of the 32nd Symposium on Hydraulic Machinery and Systems

2024 Organized 8th International R&D Conference on Global Trends in Water, Power and RE Technologies as technical partner of Central Bureau of Irrigation and Power (CBIP). Keynote speaker and session chair for two technical sessions

2024 Member of the Committee formed by the Central Electricity Authority, Ministry of Power, GoI to examine the MoC proposal of Pinnapuram PSP

2022 Topic Chair for Smart Grid and Utility Applications, IEEE Energy Conversion Congress and Expo 2022

### Institute

2022–present Member of the Institute Technical Committee

2022–2025 Member of the Institute Diversity & Inclusion Committee

2023–2024 Member of the Quality assessment/inspection committee (electrical and air-conditioning works)

2023–2024 Member of the Expert Committee to see the feasibility of the Solar PV system, cost-benefit analysis, and finalization of the model for installation of solar photovoltaic plants at IIT Roorkee

2022–present Member of project staff selection committees

2022–present Member of Student Research Committees of various students in HRED and EED

2021–2024 Faculty in-charge of Gender Advancement for Transforming Institutions (GATI) program from HRED

2021 Nominated from HRED to IIT Roorkee's Sophisticated Analytical & Technical Help Institutes (SATHI) proposal development team

### Department

2026–present Member of the Institute Disposal Committee from HRED

2025–present Faculty in-charge building of HRED

2024–present Member of the Department Research Commitee

2024–present Member of the Department Administrative Committee

2023–present Member of the Department Faculty Search Committee (Convener in 2023)

2023–present Faculty advisor or M. Tech 1st/2nd year students

2023–present Faculty in-charge of the Renewable Grid Integration Laboratory

2022–present Faculty in-charge of the Real Time SHP Simulator Laboratory

2022–present Associate Faculty in-charge of the Hydro Turbine R&D Laboratory

2022–present Faculty in-charge of the Publications facility

2022–present Leading/led the development of new laboratories, workspaces, and renovation of existing facilities

2022–2024 Member of the Department Academic Program Committee

2023 Member of the department committee formed to develop the structure for B. Tech in Energy Engineering

2022 Convener of the 1st International Conference On Hydro And Renewable Energy Net Zero Carbon Energy Systems

2021 Convener of the committee to revise AHES M. Tech programme of HRED

## Lectures and Presentations

2021-2025 Several talks delivered on grid integration of renewable energy and pumped storage hydropower in training programs organized at HRED, IITR for public and private sector engineers.

2025 Delivered a lecture on Pumped Storage Plants  Concepts and Policy Framework to officers of various PSUs at THDC Ltd.

2023 Paper presentation at the 2023 IEEE PES GT&D conference, Istanbul, Turkey, 2023.

2021 Invited Lecture at the IEEE Industrial Applications Society Student Branch Chapter of IIT Roorkee on Integration of High Levels of Variable Renewable Energy: Challenges and Opportunities

2021 Invited Lecture at REVA University, Bangalore, India. Lectures topic was Integration of High Levels of Variable Renewable Energy: Challenges and Opportunities

2021 Panelist at the Indian Association of Energy Economics - Introductory Debate on Indias Energy Transition Aspirations, Preparedness and Way Forward

2021 Invited speaker at the Northeast Power Coordinating Council (USA) DER Forum. The presentation topic was Blackstart using inverter - based resources.

2020 Paper presentation at the 2020 IEEE PES General Meeting (Virtual Meeting due to Covid 19 Pandemic). Paper presented was titled Black Start of Power Grids with Inverter-based Resources.

2020 Paper presentation at the 47th IEEE PVSC Conference, (Virtual Meeting due to Covid 19 Pandemic). Paper presented was titled Quantifying Solar PV Variability at Multiple Timescales for Power Systems Studies.

2019 Presented the MAFRIT tool to various stakeholders in Puerto Rico, including university students, faculty, and industry members as part of a workshop organized under a DOE project to introduce tools that can help improve the reliability and resilience of Puerto Rico's electric grid.

2018 Poster presentation at the 2018 IEEE T&D Conference, Denver, CO, USA, 2018: Poster presented was titled Studying the Impact of Distributed Solar PV on Power Systems using Integrated Transmission and Distribution Models.

2016 Panelist at the 2016 IEEE PES General Meeting, Boston, MA, USA. Panel session was titled Distribution Simulations at Varying Time Scales and my presentation was titled Three-Phase Dynamic Analysis of a Hybrid Transmission and Distribution Model: Impact of PV on Dynamics.

2016 Paper and poster presentation at the 2016 IEEE PES General Meeting, Boston, MA, USA, 2016: Paper presented was titled Integrated transmission & distribution system modeling and analysis: Need & advantages.

2015 Paper presentation at the 2015 IEEE IAS Joint Industrial and Commercial Power Systems / Petroleum and Chemical Industry Conference (ICPSPCIC), Hyderabad, India. Paper presented was titled Three phase dynamics analyzer: A new program for dynamic simulation using three phase models of power systems

2015 Paper presentation at the 2015 IEEE PES General Meeting, Denver, CO, USA. Paper presented was titled Application of Distributed Series Reactors in voltage balancing.

2015 Presentation on the Distributed Engineering Workstation (DEW) software at the Central Power Research Institute (CPRI), Bangalore, India.

## Professional Affiliations

Member, IEEE; Member, IEEE Power & Energy Society; Tau Beta Pi (Treasurer, Texas Eta Chapter, 2009–2010).