CURRICULUM VITAE

Udit Bhatia, Ph.D. (Northeastern University, Boston)
Pandya–Shivpuri Chair Associate Professor, Department of Civil Engineering
Joint Affiliations: Computer Science & Engineering, AI, and Earth Sciences
Indian Institute of Technology Gandhinagar
Updated: August 2026

Google Scholar

RESEARCH INTERESTS

Interdisciplinary research at the interface of climate science, hydrology, engineering, and data science, with emphasis on Physics-Guided Machine Learning for Hydrological and Earth System Processes; Water Systems, Hydroclimate Extremes, and Flood Risk; Networks and Complex Systems for Built and Natural Environments; Critical Infrastructure Resilience; and Data Science for Decision Making

APPOINTMENTS

1. Associate Professor, Department of Civil Engineering with Joint Affiliations in Department of Computer Science & Engineering and Discipline of Earth Sciences, Indian Institute of Technology Gandhinagar, April 2025–present
2. Assistant Professor, Department of Civil Engineering, Indian Institute of Technology Gandhinagar, January 2019–April 2025
3. Assistant Design Engineer, MECON Limited, 2012–2014

ACADEMIC CREDENTIALS

1. Ph.D., Northeastern University, Boston, 2018 *[CPI: 4.0/4.0] [Outstanding Graduate Research Award]*
2. M.S., Northeastern University, Boston, 2016 *[CPI: 4.0/4.0]*
3. B. Tech., National Institute of Technology, Hamirpur, 2012 *[Director Medal; Gold Medal]*

HONOURS (MEDALS, FELLOWSHIPS, PRIZES, AWARDS)

1. Pandya-Shivpuri Chair in Population Dynamics, Indian Institute of Technology Gandhinagar (2025–present)
2. Faculty Excellence Award in Teaching 2024, Indian Institute of Technology, Gandhinagar
3. Excellence Fellowship in Research (2019–2021), Indian Institute of Technology, Gandhinagar
4. College of Engineering Outstanding Graduate Research Award, Northeastern University, Boston, 2019
5. Director Medal for rank 1 in Civil Engineering Department, NIT Hamirpur, 2012
6. Best graduating student award, NIT Hamirpur, 2012
7. Dean's Fellowship, Northeastern University, Boston, 2014

SELECTED TRANSLATIONAL HIGHLIGHTS

1. Founder & Director, AIResQ ClimSols, an IIT Gandhinagar-incubated startup translating hyperlocal science into adaptation solutions for flood and heat.
2. PI and designer, AI Resilience and Command Centre, a decision-support space at Research Park, IIT Gandhinagar, operationalizing tools for climate-risk assessment, flood forecasting, and response planning.
3. Lead PI, "Rain 2 Resilience" on-ground action plan for the Municipal Corporation of Gurugram (MCG), translating urban flood-resilience research into planning and decision support.
4. Designing decision-support systems for the Gujarat State Dam Safety Organization (GSDSO) for multiple reservoirs and dams under the Dam Safety Act 2021.
5. PI, FloodResQ (AICoE–Sustainable Cities), developing flood-intelligence and decision-support tools for spatiotemporal flood-risk management and resilience enhancement in Indian urban cities.

PAPERS IN REFEREED JOURNALS

*Note: Direct students, postdoctoral fellows, and mentees are marked with underline; underline@ indicates undergraduate mentees; * indicates corresponding author; 1–29 are the works done in India, with the majority of work being done at IIT Gandhinagar; selected important papers are highlighted in blue*

1. Goyal, Shekhar Sharan, Rohini Kumar, and **Udit Bhatia*** (2026). "Quantifying Environmental Co-benefits of Nitrogen-Based Crop Restructuring and Its Implications on India's Interstate Trade Network." **Nature Communications**, 17, 7778. https://doi.org/10.1038/s41467-026-75905-w
2. Borah, Angana, Adrija Datta, Ashish S. Kumar, Raviraj Dave, and **Udit Bhatia*** (2026). "Dense Canopies Reverse the Cooling Effect of Urban Greening in Humid Cities." **Nature Communications**. https://doi.org/10.1038/s41467-026-72636-w
3. Ashish S. Kumar, Rajarshi Majumder, Vivek P. Kapadia, and **Udit Bhatia*** (2025). "Partial Flood Defenses Shift Risks and Amplify Inequality in a Core–Periphery City." **Nature Cities**. https://doi.org/10.1038/s44284-025-00299-7
4. **Udit Bhatia***, Hemant Poonia, Danish Mansoor Tantary, Vimal Mishra, and Rohini Kumar (2026). "Regional Responses to Oceanic Variability Constrain Global Drought Synchrony." **Communications Earth & Environment**. https://doi.org/10.1038/s43247-025-03111-5
5. Adrija Datta, Sarth Dubey, Tarik C. Gouhier, Auroop R. Ganguly, and **Udit Bhatia*** (2025). "Warming Demands Extensive Tropical but Minimal Temperate Management in Plant-Pollinator Networks." **Communications Earth & Environment**, 6(1), 969. https://doi.org/10.1038/s43247-025-02924-8
6. Raviraj Dave, Sushobhan Sen, Avijit Maji, and **Udit Bhatia*** (2025). "Local Damages Drive Network-Wide Costs in Compound Flood-Prone Coastal City." **npj Urban Sustainability**, 5(1), 102. https://doi.org/10.1038/s42949-025-00288-8
7. Borah, Angana, Sen, S., and **Udit Bhatia*** (2026). "Heat-stress reduction through targeted green infrastructure using computational urban climate twins." **Climatic Change**, 179(6). https://doi.org/10.1007/s10584-025-04091-3
8. Rachindra Mawalagedara, Arnob Ray, Puja Das, Jack Watson, Ashis Kumar Pal, Kate Duffy, Udit Bhatia, Daniel P. Aldrich, and Auroop R. Ganguly (2025). "Non-Linear Dynamical Approaches for Characterizing Multi-Sector Climate Impacts under Irreducible Uncertainty." **npj Climate and Atmospheric Science**, 8(1), 329. https://doi.org/10.1038/s41612-025-01208-4
9. Divya Upadhyay and **Udit Bhatia*** (2025). "Designing Resilient Multipurpose Reservoir Operation Policies in Presence of Internal Climate Variability." **Water Resources Research**, 61(7), e2024WR038160. https://doi.org/10.1029/2024WR038160
10. Ashish S. Kumar, Abhishek K. Pandey, Pranab Kumar Mohapatra, and **Udit Bhatia*** (2025). "Three-Dimensional Numerical Study of Flood-Building Interactions to Assess the Efficiency of Flood Adaptation Strategies." **ASCE Journal of Hydraulic Engineering**, 151(5), 04025028. https://doi.org/10.1061/JHEND8.HYENG-14299
11. S. S. Goyal, R. Dave, R. Kumar, and **Udit Bhatia*** (2024). "Indian Interstate Trade Exacerbates Nutrient Pollution in Food Production Hubs." **Communications Earth & Environment**, 5(1), 9. https://doi.org/10.1038/s43247-023-01178-6
12. **Udit Bhatia***, Sarth Dubey, Tarik C. Gouhier, and Auroop R. Ganguly (2023). "Network-based restoration strategies maximize ecosystem recovery." **Communications Biology**, 6(1), 1256.
13. Bhasme, Pravin, and **Udit Bhatia*** (2024). "Improving the interpretability and predictive power of hydrological models: Applications for daily streamflow in managed and unmanaged catchments." **Journal of Hydrology**, 628, 130421.
14. Tantary, Danish, Arun K. Tangirala, Raghu Murthugudde, Subimal Ghosh, Rohini Kumar, and **Udit Bhatia*** (2023). "Geographical trapping of synchronous extremes amidst increasing variability of Indian Summer Monsoon Rainfall." **Geophysical Research Letters**, 50(22), e2023GL104788.
15. Borah, Angana, Ronita Bardhan, and **Udit Bhatia*** (2023). "Protecting heritage: Insights into effective flood management using green infrastructure in a highly urbanized environment." **International Journal of Disaster Risk Reduction**, 98, 104075.

16. Kulkarni, Sujata, Raviraj Dave, **Udit Bhatia***, and Rohini Kumar (2023). "Tracing spatiotemporal changes in agricultural and non-agricultural trade networks of India." **PLOS ONE**, 18(9), e0286725.
17. Upadhyay, Divya, Sudhanshu Dixit, and **Udit Bhatia*** (2023). "Quantifying the role of internal climate variability and its translation from climate variables to hydropower production at basin scale in India." **Journal of Hydrometeorology**, 24(3), 407–423.
18. Bhasme, P., Vagadiya, J., and **Udit Bhatia*** (2022). "Enhancing predictive skills in physically-consistent way: Physics Informed Machine Learning for hydrological processes." **Journal of Hydrology**, 615, 128618.
19. Raj, S. V., Udit Bhatia, and Kumar, M. (2022). "Cyclone preparedness strategies for regional power transmission systems in data-scarce coastal regions of India." **International Journal of Disaster Risk Reduction**, 75, 102957.
20. Gangwal, U.[@], Singh, M., Pandey, P. K., Kamboj, D., Chatterjee, S., and **Udit Bhatia*** (2022). "Identifying early-warning indicators of onset of sudden collapse in networked infrastructure systems against sequential disruptions." **Physica A: Statistical Mechanics and its Applications**, 591, 126796.
21. Dave, Raviraj, Tushar Choudhari, Avijit Maji, and **Udit Bhatia*** (2022). "Quantitative framework for establishing low-risk inter-district travel corridors during COVID-19." **Transportation Research Record**, 03611981211064994.
22. Patil, R.[@], Dave, R., Patel, H.[@], Shah, V. M.[@], Chakrabarti, D., and **Udit Bhatia*** (2021). "Assessing the interplay between travel patterns and SARS-CoV-2 outbreak in realistic urban setting." **Applied Network Science**, 6(1), 1–19.
23. Dave, R., Subramanian, S. S., and **Udit Bhatia*** (2021). "Extreme precipitation induced concurrent events trigger prolonged disruptions in regional road networks." **Environmental Research Letters**, 16(10), 104050.
24. Upadhyay, D., Mohapatra, P., and **Udit Bhatia*** (2021). "Depth-Duration-Frequency of Extreme Precipitation Events Under Internal Climate Variability: Indian Summer Monsoon." **Journal of Geophysical Research: Atmospheres**, 126(8), e2020JD034193.
25. Tripathy, S. S., Udit Bhatia, Mohanty, M., Karmakar, S., and Ghosh, S. (2021). "Flood evacuation during pandemic: a multi-objective framework to handle compound hazard." **Environmental Research Letters**, 16(3), 034034.
26. Pandey, A. K., Mohapatra, P. K., Jain, V., and Udit Bhatia (2020). "Studying subcritical opposing channel flows." **Journal of Applied Water Engineering and Research**, 8(4), 262–276.
27. Harilal, N.[@], Singh, M., and **Udit Bhatia*** (2021). "Augmented convolutional LSTMs for generation of high-resolution climate change projections." **IEEE Access**, 9, 25208–25218.
28. Mishra, V., Udit Bhatia, and Tiwari, A. D. (2020). "Bias-corrected climate projections for South Asia from coupled model intercomparison project-6." **Scientific Data**, 7(1), 1–13.
29. Nanditha, J. S., van der Wiel, K., Udit Bhatia, Stone, D., Selton, F., and Mishra, V. (2020). "A seven-fold rise in the probability of exceeding the observed hottest summer in India in a 2 C warmer world." **Environmental Research Letters**, 15(4), 044028.
30. Zipper, S. C., Stack Whitney, K., Deines, J. M., Befus, K. M., Udit Bhatia, Albers, S. J., ... and Schlager, E. (2019). "Balancing open science and data privacy in the water sciences." **Water Resources Research**, 55(7), 5202–5211.
31. Brelsford, C., Dumas, M., Schlager, E., Dermody, B. J., Aiuvalasit, M., Udit Bhatia, ... and Zipper, S. C. (2020). "Developing a sustainability science approach for water systems." **Ecology & Society**, 25(2).
32. Kodra, E., **Udit Bhatia***, Chatterjee, S., Chen, S., and Ganguly, A. R. (2020). "Physics-guided probabilistic modeling of extreme precipitation under climate change." **Scientific Reports**, 10(1), 1–11.
33. **Udit Bhatia***, Sela, L., and Ganguly, A. R. (2020). "Hybrid method of recovery: combining topology and optimization for transportation systems." **Journal of Infrastructure Systems**, 26(3).
34. Udit Bhatia and Ganguly, A. R. (2019). "Precipitation extremes and depth-duration-frequency under internal climate variability." **Scientific Reports**, 9(1), 1–9.
35. Clark, K. L., Udit Bhatia, Kodra, E. A., and Ganguly, A. R. (2018). "Resilience of the US national airspace system airport network." **IEEE Transactions on Intelligent Transportation Systems**, 19(12), 3785–3794.

36. Udit Bhatia, Kumar, D., Kodra, E., and Ganguly, A. R. (2015). "Network science based quantification of resilience demonstrated on the Indian railways network." **PLOS ONE**, 10(11), e0141890.

CONTRIBUTED PAPERS IN CONFERENCE PROCEEDINGS

1. Bhasme, P. and Udit Bhatia* (2022), "Augmenting Long Short Term Memory Processes with Physics Informed Memory in the Hydrological Processes for Improved Predictability and Interpretability", in the Third Symposium on Knowledge Guided ML (KGML-AAAI-22), Westin Arlington Gateway, Virginia, USA, November 17–19, 2022.
2. Adhikary, R., Patel, Z. B., Srivastava, T., Batra, N., Singh, M., Udit Bhatia, and Guttikunda, S. (2021). "Vartalaap: What Drives #AirQuality Discussions: Politics, Pollution or Pseudo-science?" **Proceedings of the ACM on Human-Computer Interaction**, 5(CSCW1), 1–29.
3. Udit Bhatia, Samrat Chatterjee, Auroop Ratan Ganguly, Jianxi Gao, Mahantesh Halappanavar, Matthew Oster, Kevin Clark, Robert Brigantic, and Ramakrishna Tipireddy. "Aviation Transportation, Cyber Threats, and Network-of-Networks Modeling Perspectives for Translating Theory to Practice." In 2018 IEEE International Symposium on Technologies for Homeland Security (HST), pp. 1–7. IEEE, 2018.
4. Udit Bhatia and Auroop Ratan Ganguly. "Extreme Values from Spatiotemporal Chaos Precipitation Extremes and Climate Variability." In 2018 IEEE International Conference on Data Mining Workshops (ICDMW), pp. 758–762. IEEE, 2018.
5. Sela, Lina, Udit Bhatia, Janice Zhuang, and Auroop Ganguly. "Resilience Strategies for Interdependent Multiscale Lifeline Infrastructure Networks." In Computing in Civil Engineering 2017, pp. 265–272. 2017.

TEXTBOOK

Ganguly, Auroop Ratan, Udit Bhatia, and Stephen E. Flynn. *Critical Infrastructures Resilience Policy and Engineering Principles*. Routledge (2018)

PATENTS (GRANTED/SUBMITTED)

1. "Dual Barcode Method for Quantifying Spatial Redistribution of Dry Land under Flood Protection." Indian patent application, PS Patent Application No. 202621008727; IDF No. IDF/2025-26/222/UB/01; filed January 28, 2026.
2. "Protection-Induced Time-Shift Method for Quantifying Temporal Redistribution of Urban Flood Risk." Indian patent application, PS Patent Application No. 202521103502; IDF No. IDF/2025-26/223/UB/02; filed October 27, 2025.
3. Udit Bhatia, Devashish Kumar, Evan Kodra, and Auroop R. Ganguly. "System for Networking and Analyzing Geospatial Data, Human Infrastructure, and Natural Elements." U.S. Patent Number 10361907, July 2019.

SELECTED BOOK CHAPTERS

1. Warner, Mary, Udit Bhatia, and Auroop Ganguly. "From probabilistic risk analysis to resilience with network science lessons from the literature and best practice." *Handbook on Resilience of Socio-Technical Systems* (2019) 99.
2. Udit Bhatia, Devashish Kumar, Evan Kodra, and Auroop R. Ganguly. "Water Complexity and Physics-Guided Data Mining." *Water Diplomacy in Action Contingent Approaches to Managing Complex Water Problems* 1 (2017) 155.
3. Udit Bhatia and Auroop R. Ganguly. "Network Science Perspectives on Engineering Adaptation to Climate Change and Weather Extremes." In *Large-Scale Machine Learning in the Earth Sciences*, pp. 1–12. Chapman and Hall/CRC, 2017.

SELECTED RESEARCH GRANTS AND CONTRACTS

1. PI, FloodResQ (AICOE in Sustainable Cities): Spatiotemporal Flood Risk Management and Resilience Enhancement for Indian Urban Cities [~17.8 Crores; ongoing]
2. Co-PI, C-Narmada [20 Crores; ongoing]
3. PI, ANRF CRG: Network-of-Network Lens to Quantify Structural and Dynamical Aspects of Resilience of Coupled Infrastructure Systems [61.06 Lakh; ongoing]

4. IIT Gandhinagar Lead, Improving short-to-medium range extreme precipitation forecasts with climate networks and hybrid physics-ML convection parameterization [1.86 Crores; ongoing]
5. PI, Physics Guided Data Science Approach for Predictive Understanding of Hydrological Processes [78 Lakh; completed]
6. Sole PI, Developing Physics Guided Super-Resolution Approach and Evaluation Strategies for Downscaling Earth System Model Outputs [23 Lakh; completed]
7. Co-PI, Water for Change: Integrative and Fit-for-Purpose Water Sensitive Design Framework for Fast Growing Livable Cities [183 Lakh; completed]

TECHNICAL REPORTS

Ganguly, Auroop R., Evan Kodra, Udit Bhatia, Mary Elizabeth Warner, Kate Duffy, Arindam Banerjee, and Sangram Ganguly. "Data-driven solutions." *Climate 2020 Degrees of Devastation* (2018) 82–85 (UK-United Nations Assessment Report).

SELECTED INVITED TALKS

1. Udit Bhatia (2022), "Early Indicators of a sudden collapse in infrastructure networks subject to concurrent extremes: Integrating data, physics, and complexity," SERD-P NICE Workshop at Northeastern University, USA
2. Udit Bhatia (2022), "Critical Infrastructure Resilience: Role of Policymakers in India", Training Program for Indian Administrative Services Officials.
3. Udit Bhatia (2021), "Robustness and recovery of built and natural systems subject to hydrometeorological extremes: Integrating Data, Dynamics, and Complexity", Indian Institute of Technology Madras.
4. Udit Bhatia (2021), "Towards Physics Guided Data Sciences for Predictive Understanding of Earth Systems" [Keynote Talk: Indian Institute of Tropical Meteorology Pune]
5. Udit Bhatia "Urban Infrastructure Safety and Resilience including Safe Housing", State Emergency Operation Center, GSDMA, Gandhinagar (2019).
6. Udit Bhatia and Auroop Ratan Ganguly. "The Resilience of Natural-Engineered-Human-Systems." International Conference on Sustainable Infrastructures, USNAE and Chinese NAE (2016)

SELECTED ACADEMIC AND NATIONAL LEADERSHIP

1. Associate Dean, Faculty Recruitment, IIT Gandhinagar (2021–2025)
2. National Coordinator, SWAYAM Prabha (2022–present)