

Manoj Adhikari

Postdoctoral Fellow, Auburn University | Ph.D. (defended), Rensselaer Polytechnic Institute; conferral December 2026
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RESEARCH INTERESTS

Resilience of infrastructure to extreme and compound events; extreme wind hazards and nonstationary hazard modeling; wind directionality and wind loads on structures; structural reliability and performance-based design; community-scale risk assessment; physics-informed and uncertainty-aware machine learning, surrogate models, and digital twins; reliability-based code calibration

TEACHING INTERESTS

Structural Analysis; Structural Design; Structural Dynamics; Mechanics of Materials; Probability and Statistics for Engineers; Infrastructure Under Extreme Events; Structural Reliability and Risk; Wind Engineering; Machine Learning for Infrastructure Decisions

EDUCATION

Rensselaer Polytechnic Institute

Troy, NY

Ph.D., Civil Engineering; Advisor: Prof. Chris Letchford

Defended 2026; conferral December 2026

Dissertation: *A Reliability-Based Framework for Performance Assessment of Low-Rise Buildings Under Directional Wind Loading*. Committee: C. Letchford (Chair), D. Lander, M. Li, M.Z. Naser. All degree requirements completed; formal conferral in December 2026 due to the university's conferral deadlines.

Rensselaer Polytechnic Institute

Troy, NY

M.Eng., Civil Engineering

2025

Tribhuvan University

Nepal

B.E., Civil Engineering

2015

RESEARCH APPOINTMENTS

Postdoctoral Fellow

September 2026–Present

Department of Civil and Environmental Engineering, Auburn University; Supervisor: Dr. David Roueche

Appointed as TES Research Support until Ph.D. conferral (December 2026), then as Postdoctoral Fellow.

- Conducting research on wind climate, wind engineering, and structural engineering.

Graduate Research Assistant

2021–2026

Department of Civil and Environmental Engineering, Rensselaer Polytechnic Institute

- Developed a Monte Carlo reliability framework for low-rise buildings that integrates directional wind climate, wind-tunnel pressure histories, dynamic response, and uncertainty.
- Performed directional extreme value analysis (XIMIS, de Haan/GPD) of thunderstorm and synoptic wind records at six U.S. sites; applied a superstation approach for data-sparse locations.
- Quantified response-based wind directionality factors (0.47–0.95) and showed where the ASCE 7-22 value of 0.85 is unconservative (published in *Engineering Structures*).
- Showed that dynamic effects reduce serviceability reliability of a code-compliant, nominally rigid steel portal frame (β from 2.56 to 1.81).
- Developed Decision Tree, Random Forest, and XGBoost surrogates for wind load effects using the NIST–UWO aerodynamic database (R^2 up to 0.99 for interpolation; lower for roof-slope extrapolation).
- Processed and analyzed long-term wind datasets to develop extreme wind climatology and basic wind speed maps for Nepal and northern India.

TEACHING EXPERIENCE

Teaching Assistant

2021–2026

Rensselaer Polytechnic Institute

Courses: Structural Analysis; Fluid Mechanics; Applied Hydrology and Design; Engineering Design

- In every course: led recitations, supervised laboratory sessions, held office hours, graded homework and examinations, and proctored exams.
- Taught SAP2000 (Structural Analysis) and HEC-HMS (Applied Hydrology and Design) to undergraduate students.
- Mentored students on coursework and design projects; helped develop instructional materials.

PROFESSIONAL EXPERIENCE

Senior Civil Engineer

2018–2021

Paragon Engineering Consultancy and Research Center Pvt. Ltd., Nepal

- Performed structural analysis and design of residential and commercial reinforced-concrete and steel buildings under gravity, wind, and seismic loads.
- Prepared construction drawings, connection details, and structural detailing using AutoCAD.
- Applied design standards and load combinations for gravity, wind, and seismic loading.
- Coordinated with architects, contractors, and regulatory agencies to ensure safe and code-compliant construction; conducted site visits to verify implementation and resolve field issues.
- Developed cost estimates, technical reports, and engineering documentation for government and private clients.

Civil Engineer / Coordinator

2016–2018

National Society for Earthquake Technology – Nepal (NSET)

- Performed structural evaluation and design support for building systems.
- Conducted site inspections, quality control, and construction supervision, including on-the-job training sites.
- Assisted in seismic-resistant design practices and delivered training programs.
- Prepared engineering drawings, reports, and technical documentation.

Volunteer, Post-Earthquake Damage Assessment

2015–2016

National Society for Earthquake Technology – Nepal (NSET)

- Conducted post-disaster structural damage assessments of residential buildings following the 2015 Gorkha (Nepal) earthquake.
- Evaluated structural damage, load paths, and failure mechanisms; contributed to engineering reports used for rehabilitation and reconstruction planning.

PUBLICATIONS

Peer-Reviewed Journal Articles

Adhikari, M., & Letchford, C.W. (2026). Evaluation of wind directionality factors on moments and displacements of a low-rise building. *Engineering Structures*, 369(2), 123833. <https://doi.org/10.1016/j.engstruct.2026.123833>

Adhikari, M., & Letchford, C.W. (2025). Exploring wind load effects on structures: An insight into machine learning applications. *Wind and Structures*, 40(3), 167–177. <https://doi.org/10.12989/was.2025.40.3.167>

Adhikari, M., & Letchford, C.W. (2023). Extreme wind climatology of Nepal and northern India. *Wind and Structures*, 37(2), 153–161. <https://doi.org/10.12989/was.2023.37.2.153>

Adhikari, M., Bhattarai, A., & Thapa, R. (2020). Qualitative evaluation of technical parameter of resiliency: A case study of Nuwakot district, Nepal. *Journal of Institute of Science and Technology*, 25(2), 25–32. <https://doi.org/10.3126/jist.v25i2.33731>

Manuscripts Under Review

Adhikari, M., Letchford, C.W., & Li, M. Reliability assessment of a low-rise structure under wind loading: Implications for serviceability reliability and the wind directionality factor. *Engineering Structures* (under review).

Dissertation

Adhikari, M. (2026). *A Reliability-Based Framework for Performance Assessment of Low-Rise Buildings Under Directional Wind Loading*. Ph.D. Dissertation, Rensselaer Polytechnic Institute, Troy, NY.

CONFERENCE PRESENTATIONS

Adhikari, M., & Letchford, C.W. Reliability assessment of wind loads on low-rise structures using the NIST aerodynamic database. *15th Americas Conference on Wind Engineering (15ACWE)*, Missouri University of Science and Technology, St. Charles, MO, USA, May 19–22, 2025.

Adhikari, M., & Letchford, C.W. Reliability assessment of wind loads on low-rise structures using the NIST aerodynamic database. *7th American Association for Wind Engineering (AAWE) Workshop*, Ann Arbor, MI, USA, June 9–11, 2024.

Adhikari, M., & Letchford, C.W. Deep and traditional machine learning models to predict pressure coefficients on low-rise building surfaces. *16th International Conference on Wind Engineering (ICWE16)*, Florence, Italy, August 27–31, 2023.

Adhikari, M., & Letchford, C.W. Extreme wind climatology of Nepal and northern India. *14th Americas Conference on Wind Engineering (14ACWE)*, National Wind Institute, Texas Tech University, Lubbock, TX, USA, May 17–19, 2022.

PROFESSIONAL SERVICE

Journal Peer Review (4 manuscripts)

Journal of Structural Engineering (ASCE)

3 manuscripts, 2026

Wind and Structures (Techno-Press)

1 manuscript, 2026

TRAVEL SUPPORT

Conference Travel Funding

2024, 2025

Department of Civil and Environmental Engineering, School of Engineering, and Office of Graduate Education, Rensselaer Polytechnic Institute. Supported presentations at the 7th AAWE Workshop (2024) and the 15th Americas Conference on Wind Engineering (2025).

TECHNICAL SKILLS

Hazard and reliability methods: Extreme value analysis (XIMIS, de Haan/GPD, Gumbel, GEV), directional wind hazard analysis, Monte Carlo simulation, structural reliability, fragility curves, uncertainty quantification, statistical modeling

Structural analysis: Linear and dynamic time-history analysis, modal and spectral (PSD) analysis, wind tunnel pressure data processing, performance-based design

Machine learning: Decision Tree, Random Forest, XGBoost, ANN, CNN, hyperparameter optimization, surrogate modeling

Software: SAP2000, ETABS, OpenSees/OpenSeesPy, Ansys, Siemens NX, AutoCAD, Revit, HEC-HMS, QGIS

Programming: Python (NumPy, SciPy, scikit-learn), MATLAB, LaTeX

PROFESSIONAL MEMBERSHIPS

American Society of Civil Engineers (ASCE); Nepal Engineering Council; Nepal Engineers' Association