Asad Ur Rahman

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Professional Summary

Structural Engineering PhD candidate with over 5 years of research and teaching experience. Expertise in seismic hazard assessment, digital twin development, and deep learning applications in structural engineering. Seeking opportunities to contribute to innovative structural engineering solutions.

Education

University of Houston, Houston **Sep 2021 – July 2026**
PhD Structural Engineering *Houston, USA*

National University of Science and Technology, Islamabad **Sep 2017 – Sep 2020**
M.S Structural Engineering *Islamabad, Pak*

University of Engineering and Technology (UET), Peshawar **Sep 2013 – Jun 2017**
B.E Civil Engineering *Peshawar, Pak*

Relevant Coursework

- Adv Concrete Design
- Finite Element Modeling
- Adv Structural Dynamics
- Deep learning
- Geology and Seismology
- Digital Image Metr

Work Experience

PhD, Graduate Research Assistant

Structural and Artificial Intelligence Lab (SAIL) Aug 2021 – Present
University of Houston (UoH) Houston, USA

- **Digital Twins of Bridges:** Collected image datasets for the GHSA (Galveston, Harrisburg & San Antonio) Railroad Bridge and Main Street viaduct, Houston, utilizing SKYDIO X2 & SKYDIO 2+ drones. Utilized the datasets to generate digital twins of the structures using software like Reality Capture, iTwin (Bentley), and Web ODM.
- **Correction Detection:** Collecting a corrosion image dataset from the NAVY ship (USS Paul Foster). Labeled the dataset and trained a Segformer model achieving 71% accuracy and 60% MIOU on the testing dataset.
- **Damages Segmentation:** Contributed to a Kaggle competition involving the training of a deep learning model for semantic segmentation of damages (dacl10K dataset). Employed the Segformer model for training in the competition.

Graduate Structural Engineering Intern

Diagnostics Department June 2025– Aug 2025
Walter P Moore Houston, USA

- Developed internal tools for streamlined damage annotation of structural imagery and point clouds.
- Trained deep-learning models for automated damage segmentation.
- Created digital twins of structures and implemented quantitative damage assessment.

Graduate Teaching Assistant

Civil and Environmental Engineering Sep 2021 – Dec 2021
University of Houston (UoH) Houston, USA

- Assisted professors in grading assignments, and Exams.
- Provided guidance and support to undergraduate students in understanding engineering concepts.
- Conducted office hours sessions to enhance students' practical skills.

Lecturer

Civil Engineering Department Feb 2021 - July 2021
Swedish College of Engineering and Technology Taxila, Pakistan

- Delivering lectures on various civil engineering subjects such as "Special Topics", and "Survey 2" to undergraduate students.
- Developing and updating course curriculum in line with industry standards and advancements.
- Conducting assessments, grading examinations, and providing constructive feedback to students.
- Oversaw the research activities of two undergrad groups.

Structural Design Engineer (Internship)

Ahmed Tariq Ashraf Engineering Consultants (ATAC) Sep 2020 - Jan 2021

- Assisted in the structural design of building projects under the guidance of senior engineers.
- Contributed to the preparation of design documentation, drawings, and specifications.
- Conducted structural analysis and calculations using relevant software.
- Collaborated with the team to ensure design compliance with relevant codes and standards.

Graduate Teaching Assistant
NUST Institute of Civil Engineering (NICE) Sep 2018 – Jul 2019
National University of Science and Technology Islamabad, Pakistan

- Assisted faculty members in teaching undergraduate courses in civil engineering.
- Conducted tutorial sessions, provided additional academic support to students, and graded assignments.
- Participated in the planning and execution of laboratory experiments.
- Contributed to the assessment and improvement of course materials.

Publications

Journal Articles

1. Varghese, S., Gao, J., Rahman, A. U., & Hoskere, V. (2025). BridgeEQA: Virtual Embodied Agents for Real Bridge Inspections. *arXiv preprint* arXiv:2511.12676. https://arxiv.org/abs/2511.12676

2. Rahman, A. U., & Hoskere, V. (2026). Automated framework for element-level bridge inspection. *Automation in Construction* (manuscript in preparation; to be submitted).

3. Hoskere, V., Hassanlou, D., Rahman, A.U., Bazrgary, R., & Ali, M.T. (2025). Unified framework for digital twins of bridges. *Automation in Construction*, 175, 106214. https://doi.org/10.1016/j.autcon.2025.106214

4. Rahman, A.U., & Hoskere, V. (2025). Instance segmentation of reinforced concrete bridge point clouds with transformers trained exclusively on synthetic data. *Automation in Construction*, 173, 106067. https://doi.org/10.1016/j.autcon.2025.106067

5. Hoskere, V., & Rahman, A.U. (2024). Geometric digital twins of RC bridge point clouds using instance segmentation. In *Proceedings of the IABSE Congress, San José 2024: Beyond Structural Engineering in a Changing World* (paper 0977). https://doi.org/10.2749/sanjose.2024.0977

6. Munir, S., Najam, F. A., Malik, U. J., Rana, I. A., & Ali, A. (2024). Seismic evaluation of non-seismically detailed RC buildings in Pakistan: Performance and damage accumulation under repeated earthquakes. *Bulletin of Earthquake Engineering*, 1–33. https://doi.org/10.1007/s10518-021-01054-8

7. Rahman, A., Najam, F. A., Zaman, S., Rasheed, A., & Rana, I. A. (2021). An updated probabilistic seismic hazard assessment (PSHA) for Pakistan. *Bulletin of Earthquake Engineering*, 19(8), 1–38. https://doi.org/10.1007/s10518-021-01054-8

8. Rahman, A., Rasheed, A., Najam, F. A., Zaman, S., Rana, I. A., Aslam, F., & Khan, S. U. (2021). An updated earthquake catalogue and source model for seismic hazard analysis of Pakistan. *Arabian Journal for Science and Engineering*, 1–23. https://doi.org/10.1007/s13369-021-05439-4

9. Qureshi, M. I., Khan, S. U., Rana, I. A., Ali, B., & Rahman, A. (2021). Determinants of people's seismic risk perception: A case study of Malakand, Pakistan. *International Journal of Disaster Risk Reduction*, 102078. https://doi.org/10.1016/j.ijdrr.2021.102078

Reports

1. Roueche, D. B., Kalliontzis, D., Hoskere, V., Kotzamanis, V., Bazrgary, R., Khan, W., Rahman, A. U., Kenawy, M., Erazo, K., Ghahremani, K., Pham, H., Capa Salinas, J., Kijewski-Correa, T., Prevatt, D. O., & Robertson, I. (2024). *StEER 2024 Houston Derecho Joint Preliminary Virtual Reconnaissance Report and Early Access Reconnaissance Report (PVRR-EARR)*. Report No. PRJ-4704. https://doi.org/10.17603/ds2-xgvz-5790

Conferences

1. Presented at the EMI 2023 Conference with the title: "Data Augmentation Methods for Improved Sim2Real Transfer of Segmentation of Synthetic Bridge Point Clouds."

Funded Research Projects

Developing Digital Twins for Texas Bridges (On Going)
Funding Source: Texas Department of Transportation (TxDOT)
Role: Research Associate
Duration: 3 years

- Collected and processed the Images and Point cloud data of Bridges.
- Developed synthetic bridge point cloud dataset.
- Trained a deep learning model for instance and semantic segmentation of the structural components of bridges.

Updating the Seismic Hazard Maps for the Building Code of Pakistan
Funding Source: Pakistan Engineering Council (PEC)
Role: Research Associate
Duration: 5 months

- Conducted a comprehensive literature review on the latest seismic hazard assessment methodologies and codes.
- Collected and examined seismic data, including earthquake catalogues and information on crustal faults.
- Contributed in modeling, and analysis efforts.

The site-specific Probabilistic Seismic Hazard Assessment (PSHA) for Gulpur Hydropower project
Funding Source: DAELIM company Seoul, South Korea
Role: Research Associate
Duration: 6 months

- Collected geological and seismological data relevant to the Gulpur Hydropower Project site.
- Applied advanced probabilistic seismic hazard assessment techniques to quantify seismic hazard of the project site.
- Collaborated closely with international experts and engineers from DAELIM company.
- Prepared and delivered technical presentations on seismic hazard assessment findings to project stakeholders.

The site-specific probabilistic seismic Hazard Assessment (PSHA) for Naya Pakistan Housing (NPH) project
Funding Source: NESPAK, Pakistan
Role: Research Associate
Duration: 6 months

- Conducted a detailed review of geological and seismological conditions at the Naya Pakistan Housing Project sites at Islamabad Capital territory.
- Utilized probabilistic seismic hazard assessment tools to evaluate potential ground shaking and seismic hazard.
- Worked closely with NESPAK engineers to integrate seismic safety measures into the project's structural design.