Muhammad Usman Hanif PhD, PE

Assistant Prof NUST, Pakistan | Post-Doc Researcher, South Korea

linkedin.com/in/usmanhnf github.com/usmanhnf usmanhnf@gmail.com
+92 334 545 6200 usman.hanif@nice.nust.edu.pk Chungju-si South Korea

Education

2014-2018 **Ph.D. in Structural Engineering,** *University of Malaya,* **Malaysia**
Thesis Title : *Nonlinear vibration-based modeling for damage detection of reinforced concrete beams*

2009-2012 **M.Sc. in Structural Engineering,** *National University of Sciences and Technology (NUST),* **Pakistan**
Thesis Title : *Effect of longitudinal reinforcement ratio on minimum shear reinforcement ratio in reinforced concrete beams*

2005-2009 **B.Sc. in Civil Engineering,** *University of Engineering and Technology Lahore,* **Pakistan**
Thesis Title : *Validation of existing cone penetration test correlations based on laboratory testing*

Academic Experience

2022-Continued | **Postdoctoral Research Fellow, Korea National University of Transportation (KNUT), South Korea**
- I am working with my research team on health monitoring of retrofitted concrete beams using acoustic emission technique.
- I am also running computational analysis to carry out parametric analysis on design provisions for precast slab-wall joints in precast concrete constructions.

2019-Continued | **Assistant Professor, National University of Sciences & Technology (NUST), Pakistan**
- UG Courses : **Engineering Mechanics, Mechanics of Solids - I, Mechanics of Solids - II, Plain & Reinforced Concrete - II, Engineering Drawing**
- Graduate Courses : **Advanced Modeling and Simulation, Advanced Structural Mechanics, Advanced Concrete Design, Research Methodology**

2018 | **Tutor, Universiti Malaya, Malaysia**
- Assisted professor in tutoring Engineering Drawing course for undergraduate students that involved manual drawing and AutoCAD drafting

Research Projects

2022-2025 (0.3M USD) | **Co-PI | NRPU Higher Education Commission HEC), Pakistan, (PKR 67.7 Million)**
Project Title : *Development of testbed of a prototype bridge for real-time health monitoring of reinforced concrete bridges*
- Currently we are developing a hybrid test bed of a prototype bridge inside the campus which will be fixed with vibration sensors and will collect ambient vibration data. We will be developing and calibrating low-cost sensors on the testbed.

2022-2023 (23k USD) | **Co-PI | King Khalid University), Saudi Arabia, (SAR 86,867)**
Project Title : *Developing effective links in Construction systems*
- The project is a collaboration with Kind Khalid University Saudi Arabia. The work is focused on adopting the advanced technology in construction practices in Saudi Arabia.

2022-2024 79k USD | **Principal Investigator | Pakistan Science Foundation (PSF), Pakistan, (PKR 17.5 Million)**
Project Title : *Damage assessment of reinforced concrete beams using vibration-based procedures*
- I am working on developing bridge demographics database for the inventory bridges of Pakistan
- Vibration-based methods will be used for condition assessment of the existing structures
- Inverse engineering problem will be solved using damage-induced nonlinearities
- I have already developed MEMS-based cost-effective system for continuous health monitoring of concrete bridges

2018-2019 | Graduate Research Assistant | Universiti Malaya Research Grant (UMRG), Malaysia, (MYR 50,000)
11k USD | Project Title : *Assessment of Soil Foundation-Structure Interaction of the Asal Lambaa Longhouses*

- Managed and collected the field data for structural assessment of heritage structures (longhouses) in remote village of Bario, East Malaysia
- Limited resources were used for taking field results
- I used the field data to develop finite element model of longhouses
- Our structural assessment analysis showed that the longhouses were in serviceable condition

2015-2017 | Research Assistant | Postgraduate Research Grant (PPP) Universiti Malaya, Malaysia, (MYR 13,000)
3k USD | Project Title : *Damage Detection of Reinforced Concrete Structures*

- Developed relationships between damage and natural frequencies to assess life-cycle of a structure
- Impact-based excitation was used to determine natural frequency
- The experimental investigation and finite element simulation showed good agreement

2014-2019 | Research Assistant | International Graduate Research Assistant (iGRA) Universiti Malaya, Malaysia, (MYR 200,000)
11k USD | Project Title : *A New Approach For Concrete Bridge Condition Assessment Through Dynamic Testing*

- Developed a methodology for damage assessment of reinforced concrete beams using nonlinearity
- I used experimental/computational assessment to address the inverse engineering problem in damage assessment of existing infrastructure
- I lead a team of graduate and undergraduate students to design experimental setup
- I collaborated with electrical engineering, computer sciences departments to achieve the multidisciplinary nature of the project

Publications

2023 Hanif, M. U., Seo, S. Y., Tran, H. V., & Khol, S. (2023). Monitoring and characterizing the debonding in CFRP retrofitted RC beams using acoustic emission technology. *Under Review*

2022 Khan, S. M., Hanif, M. U., Khan, A., Hassan, M. U., Javanmardi, & A., Ahmad, A. (2022). Damage assessment of reinforced concrete beams using cost-effective MEMS accelerometers *In Structures (Vol. 41, pp. 602-618). Elsevier.*

2021 Javanmardi, A., Ghaedi, K., Huang, F., Hanif, M. U., & Tabrizikahou, A. (2021). Application of Structural Control Systems for the Cables of Cable-Stayed Bridges : State-of-the-Art and State-of-the-Practice. *Archives of Computational Methods in Engineering, 1-31.*

2021 Hanif, M. U., Ibrahim, Z., Jameel, M., Ghaedi, K., & Hashim, H. (2021). Simulation-based non-linear vibration model for damage detection in RC beams. *European Journal of Environmental and Civil Engineering, 25(8), 1379-1404.*

2021 Tariq, M., Khan, A., Shayanfar, J., Hanif, M. U., & Ullah, A. (2021). A regression model for predicting the shear strength of RC knee joint subjected to opening and closing moment. *Journal of Building Engineering, 102727.*

2020 Javanmardi, A., Ibrahim, Z., Ghaedi, K., Ghadim, H. B., & Hanif, M. U. (2020). State-of-the-art review of metallic dampers : testing, development and implementation. *Archives of Computational Methods in Engineering, 27(2), 455-478.*

2018 Hanif, M. U., Ibrahim, Z., Ghaedi, K., Hashim, H., & Javanmardi, A. (2018). Damage assessment of reinforced concrete structures using a model-based nonlinear approach–A comprehensive review. *Construction and Building Materials, 192, 846-865.*

2016 Hanif, M. U., Ibrahim, Z., Jameel, M., Ghaedi, K., & Aslam, M. (2016). A new approach to estimate damage in concrete beams using non-linearity. *Construction and Building Materials, 124, 1081-1089.*

Conference Procedings

2022 Ahmad, M., Tariq, H., Ahmad, G., Khan, M. W. A., & Hanif, M. U. (2022, August). Modeling and analysis of a concrete bridge using 3D Reconstruction Technique. In *The 2nd International Symposium on Civil, Environmental, and Infrastructure Engineering 2022 (ISCEIE 2022), Yogyakarta, Indonesia.*

2020 Almohagry, A. A., Ibrahim, Z., Athar, F. A., Hanif, M. U., & Zaki, A. (2021). Performance of precast beam to column connection with billet connector using fem. In *4th international conference on sustainable innovation 2020–technology, engineering and agriculture (ICoSITEA 2020) (pp. 55–59).* Atlantis Press.

2020 Athar, F. A., Ibrahim, Z., Almohagry, A. A., Hanif, M. U., & Zaki, A. (2021). Finite element modelling of semi-rigid beam to column connection with partly hidden corbel. In *4th international conference on sustainable innovation 2020–technology, engineering and agriculture (ICoSITEA 2020) (pp. 74–79). Atlantis Press.*

2017 Hanif, M. U., Ibrahim, Z., Lim, H. X., & Hang, Y. X. (2017). Effect of incremental static damage on modal frequencies of reinforced concrete beams. In *4th international conference on civil and environmental engineering for sustainability 2017 (IConCEES 2017). Universiti Tun Hussein Onn Malaysia, Malaysia.*

2017 Rehman, S. K. U., Ibrahim, Z., Javed, M. F., & Hanif, M. U. (2017). Piezo-resistive characteristics of graphene-based cement materials. In *Proceedings of the 24th International Congress on Sound and Vibration (ICSV24), London, United Kingdom, 9–10.*

2017 Rehman, S. K. U., Ibrahim, Z., Javed, M. F., Hanif, M. U., & Ghaedi, K. (2017, February). Self-sensing carbon based cement composite material. In *Proceedings of the 2nd International Conference on Advances in Engineering and Technology (RTET-2017), Penang, Malaysia (pp. 9-10)*

2016 Hanif, M. U., Ibrahim, Z., Jameel, M., Ghaedi, K., Javanmardi, A., & Rehman, S. K. (2016). Finite element simulation of damage in reinforced concrete beams. In *13th international conference on concrete engineering and technology 2016 (concet2016). Unversiti Teknologi Mara.*

Workhops and Trainings

SAP2000 Introduction Training	Introductory SAP2000 training every 3rd semester in Engineering Mechanics course at undergraduate level
MatLab Introductory Training	I have conducted training for research students in preparing visual demonstrations of principal stresses and cross-sectional analysis
ABAQUS Introductory Workshop	I carry out ABAQUS training sessions for graduate students on yearly basis
Mendeley Hands-on Workshop	Being official advisor of Mendeley referencing Software, I have conducted a hands-on workshop at University level in May, 2019

Professional Experience

Apr'11-Mar'14 | **Structural Engineer | Architectural & Civil Engineering Services (ACES), Rawalpindi, Pakistan**

Design of Commercial/Residential structures : Performed the Computer-aided analysis and Design of various structures such as houses, residential apartments, commercial plazas, school building and storage sheds. The major design project during my job was design of a post-tensioned, 563m long, flyover bridge.

Structural evaluation of existing structures : Evaluated designs of various existing structures against earthquake zone 2b and participated in various retrofitting / re-strengthening projects including commercial plazas and houses.

Aug'09-Mar'11 | **Construction Manager | Bioresource Research Center (BRC) & World Society for the Protection of Animals (WSPA), Islamabad, Pakistan**

Design and construction supervision : Under the project funded by *World Society for the Protection of Animals (WSPA)*, an NGO recognized by United Nations, I designed and supervised the construction of an animal sanctuary spanning 25 acres near Balkasar, Pakistan. I also managed the entire construction of the project by co-ordinating with contractors while ensuring timely completion and coordinating monetary constraints set forth at the initial planning/design phase.

Design and construction of overhead water tank : I also designed and supervised the construction of a 1440 m3 capacity overhead water tank for storage purposes.

Jul'08-Aug'08 | **Engineering Internee | National Engineering Services Pakistan (NESPAK), Islamabad, Pakistan**

3D panel Construction : Under the project funded by Earthquake Reconstruction & Rehabilitation Authority (ERRA), I was part of the team which debuted the building construction using 3D panels and shot-creting technique.

Consultancy Projects

Review and Revision of Community Physical Infrastructure (CPI) Manual April 2021 – November 2021

Funding Agency : Pakistan Poverty Alleviation Fund (PPAF), Islamabad Pakistan
The consultancy assignment includes revising the CPI manual with design procedures that are handy for the field engineers to deploy construction effectively with basic engineering knowledge.

Strengthening of 40 year old Warehouses April 2021 – June 2021

Funding Agency : Perunding MPA sdn. Bhd and Pasofal plt., Kuala Lumpur, Malaysia
A total of four existing structural steel warehouses were analyzed against British Standards and economic strengthening solutions were advised.

Design of Flood Mitigation Scheme at District at Swabi - Pakistan February 2021 – April 2021

Funding Agency : Ghazi Barotha Taraqiati Idara (GBTI) Pakistan, Islamabad Pakistan
During rainfalls, the flash-floods from the adjacent mountains damage the cultivable land, as a result of which 2km long plum concrete retaining wall was designed to protect the land against floods

Design of Bank Protection works at Sundus Village, Skardu - Pakistan January 2021 – April 2021

Funding Agency : Mountain and Glacier Protection Organization (MGPO) Pakistan, Skardu Pakistan
Design of Bank protection wall (plum concrete) and reclamation works along River Indus was carried out in Skardu, Pakistan.

Non-destructive Testing of Damaged Foundation of Steam Turbine, Guddu December 2020 – July 2021

Funding agency : NESPAK pvt Pakistan, Guddu Pakistan
Vibration analysis of the structure was carried out using Eccentric Mass Vibrator (EMV) and the identified modal properties were proposed for model-updating of the structure.

Renovation of Level 2 of Za'ba Library including Civil, Mechanical and Electrical Works 2015 – 2017

Funding agency : Za'ba Library, University of Malaya, Kuala Lumpur, Malaysia
As part of the consulting team at University of Malaya, I carried out the FE analysis of the existing library floor for addition of another floor for renovation as Za'ba Museum.

Collaborative Learning Area (CoLA) Project in Main Library, University of Malaya 2013 – 2014

Funding agency : Main Library, University of Malaya, Kuala Lumpur, Malaysia
As part of the consulting team at University of Malaya, I carried out the FE analysis for construction of the additional mezzanine floor in University Main Library.

Computer Skills

Programming/Simulation	MATLAB, ABAQUS, LATEX, HTML5, PYTHON (Jupyter Notebooks), Ansys Mechanical APDL, Jekyll
Structural Design	SAP2000, ETABS, SAFE, STAADPro
Drafting and Graphics	AutoCAD, Sketchup, MS Office, Visio, Photoshop

Memberships

- PE - Pakistan Engineering Council (Signatory of Washington Accord) (PEC No. Civil/29189)
- RILEM (Member ID : 40766)
- American Concrete Institute (ID:1177728)
- American Society of Civil Engineers (ID : 10023794)
- Institute of Structural Engineers (IStructE)
- Mendeley Official Advisor
- MENSA
- Adventure Club Pakistan
- Pakistan Wildlife Foundation (PWF)
- World Wildlife Fund (WWF)
- Malaysian Nature Society (O/E/31979/B)
- The Rimba Project - Universiti Malaya