

Dr. Syed Hassan Farooq

Postdoctoral Research Associate | Howard University

Dr. Syed Hassan Farooq is a structural engineer, researcher, and educator with extensive academic and professional experience in structural engineering, infrastructure resilience, structural health monitoring, and advanced structural analysis. He currently serves as a Postdoctoral Research Associate at Howard University, where he contributes to research on intelligent infrastructure monitoring, damage detection, and localization of civil infrastructure.

At Howard University, Dr. Hassan is involved in the development of an intelligent surveillance platform for civil infrastructure, integrating structural sensing, artificial intelligence, numerical simulation, and autonomous monitoring technologies. He is also leading structural health monitoring activities for the Francis Case Memorial Bridge in Washington, DC, including field reconnaissance, structural characterization, vibration measurements, sensor deployment, baseline response assessment, and development of approaches for detecting changes in structural behavior.

Dr. Hassan has more than three decades of professional experience in civil and structural engineering, including extensive experience in structural design, engineering management, teaching, and research. Prior to joining Howard University, Dr. Farooq also conducted research at George Mason University on fretting fatigue and contact-induced damage in structural and mechanical components. His work involved computational investigation of the contact behavior and fatigue response of metallic interfaces subjected to combined normal and cyclic loading. Using finite-element analysis, he studied contact pressure distributions, frictional effects, local stress concentrations, microslip, debris formation, and the initiation and evolution of localized damage at contacting surfaces. The research incorporated advanced numerical modeling to evaluate potential crack initiation locations and fatigue damage mechanisms, providing insights into the relationship between contact mechanics, material behavior, and structural durability. Moreover, he also served in senior engineering and academic positions in Pakistan, including Director Design (Civil) with the Defense Production Division and academic leadership positions at the National University of Sciences and Technology (NUST), where he served as Head of Structural Engineering and held other teaching and administrative responsibilities.

His technical expertise includes reinforced and prestressed concrete structures, steel structures, seismic analysis and design, structural health monitoring, blast-resistant and hardened structures, structural assessment and retrofitting, finite-element analysis, and

structural dynamics. He has extensive experience with structural analysis and design software including ABAQUS, SAP2000, ETABS, SAFE, Revit and Perform-3D.

Dr. Hassan's research interests encompass structural health monitoring, vibration-based damage detection, seismic vulnerability assessment, structural reliability, advanced materials, blast-resistant structures, progressive collapse, structural retrofitting, and the application of artificial intelligence and machine learning to civil infrastructure. His work combines experimental investigation, numerical modeling, field measurements, and data-driven techniques to address challenges in the assessment and resilience of aging and critical infrastructure.

As an educator, Dr. Hassan has taught structural engineering and civil engineering courses at the undergraduate and graduate levels. His teaching approach emphasizes fundamental understanding, practical engineering application, structural behavior, and the integration of analytical and computational methods. He is particularly interested in preparing engineering students to address real-world structural problems through a combination of theory, modeling, experimentation, and field observation.

Dr. Hassan is a Professional Engineer (Pakistan Engineering Council) and has experience with U.S. and international structural engineering standards, including ACI, ASCE, AISC, ASTM, and related provisions for structural design and assessment. He has also contributed to engineering education and accreditation activities, including outcomes-based education and Washington Accord-related program evaluation.

His current work at Howard University reflects his broader professional goal of combining structural engineering expertise with emerging technologies including sensing, artificial intelligence, machine learning, numerical simulation, and data analytics to develop more intelligent, reliable, and resilient civil infrastructure.