



## **RAO ARSALAN KHUSHNOOD, Ph.D.**

**Associate Professor (Structural Engineering)**

### **HOD Research**

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## **I. Biographical sketch and career**

### **Education:**

- Ph.D. Structural Engineering (2015) Politecnico di Torino, Turin, Italy
- M.E. Structural Engineering (2011)  
National University of Sciences & Technology (NUST), Islamabad, Pakistan
- B. E. Civil Engineering (2009)  
National University of Sciences & Technology (NUST), Islamabad, Pakistan

### **Experience:**

<b>Designation</b>	<b>Duration</b>	<b>Responsibilities</b>
HOD Research, NUST, Pakistan	Aug 2021 – Present	<ul style="list-style-type: none"><li>• Decision making for improving the research outcomes at the institute</li><li>• Managing the research activities of the institute and linking them with industry</li><li>• Planning and executing projects, managing staff, and reporting findings to upper management</li><li>• Conducting research to support an organization's goals, objectives, and policies</li><li>• Collaborating with other team members to develop and implement the research strategies</li></ul>
Associate Professor, NUST, Pakistan	April 2021 – Present	<ul style="list-style-type: none"><li>• Delivering lectures to UG, MS and PhD level students</li><li>• Developing the course curriculum</li><li>• Design and implementation of innovative methods of teaching</li><li>• Providing guidance and supervision to graduate students</li><li>• Conducting research and publishing the results</li></ul>
Assistant Professor, NUST, Pakistan	Jul 2015 – April 2021	<ul style="list-style-type: none"><li>• Delivering lectures to UG, MS and PhD level students</li><li>• Developing teaching directives for online teaching and quality assessment of UG/PG courses</li></ul>

		<ul style="list-style-type: none"> <li>• Providing guidance and supervision to graduate students</li> <li>• Conducting research based conferences and seminars collaborating with international and national bodies</li> </ul>
Director Local Quality Enhancement Cell (DLQEC), NUST, Pakistan	Feb 2016 – July 2021	<ul style="list-style-type: none"> <li>• Developing qualifications framework by setting out the attributes and abilities of qualification holder</li> <li>• Reviewing and developing quality standards and the quality of teaching and learning strategies</li> <li>• Reviewing academic affiliations with other institutions in terms of effective management of standards and quality of programs</li> <li>• Quality assurance of MS and PhD degree programs</li> </ul>
OBE Coordinator, NUST, Pakistan	Feb 2016 – July 2021	<ul style="list-style-type: none"> <li>• Implementing and providing guidance and training on outcome base education (OBE)</li> <li>• Creating supplemental instructional materials</li> </ul>
HOD structural Engineering, NUST, Pakistan	Feb 2018 – Feb 2021	<ul style="list-style-type: none"> <li>• Curriculum development</li> <li>• Faculty mentor</li> <li>• Departmental budgeting and budget control</li> <li>• Class schedule planning</li> <li>• General supervision of the teaching, research, and service and related scholarly activities of the department</li> </ul>
PhD Candidate/Researcher, Politecnico di Torino, Turin, Italy	Jan 2012 – May 2015	<ul style="list-style-type: none"> <li>• Commitment of adequate time and effort to the research project</li> <li>• Identifying and resolving problems relating to the research.</li> <li>• Management of experimental work efficiently.</li> <li>• Writing and publishing new research methods and application related observations</li> </ul>
Lecturer, NUST, Pakistan	Aug 2011 – Feb 2012	<ul style="list-style-type: none"> <li>• Planning teaching, including lectures, seminars/tutorials and learning materials.</li> <li>• Meeting students individually to discuss progress.</li> <li>• Checking and assessing students' work.</li> <li>• Advising final year projects of research students.</li> <li>• Carrying out administration, such as attending faculty meetings and writing reports</li> <li>• Writing research proposals, papers, and other publications</li> <li>• Managing research budgets</li> <li>• Preparing bids for funding for departmental research projects</li> </ul>
Laboratory Engineer, NUST, Pakistan	Aug 2009 – Aug 2011	<ul style="list-style-type: none"> <li>• Maintenance and management of the Structures Lab, concrete testing equipment, in all aspects of sample preparation and casting.</li> <li>• Advise and support students in the design, construction, and provision of research and laboratory experiments.</li> <li>• Creating engineering design plans, by hand or with computer-aided design (CAD) software.</li> <li>• Supervising and demonstrating the safe use of laboratory equipment to the students.</li> <li>• Preparing estimates of labor costs and the amount and type of materials.</li> </ul>

Internee at Frontier Works Organization, Pakistan	Feb 2009 – Apr 2009	<ul style="list-style-type: none"> <li>• Generating reports, analyzing budget goals and cost estimates</li> <li>• Site visits for important updates and providing project improvement recommendations</li> </ul>
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### **Academic Honors & Awards:**

- Awarded with **Best Innovator Award** for the year 2021 by NUST.
- Awarded with **Maximum Grants Secured** for the year 2019-21 by NUST.
- Awarded with **Belt & Road Young Scientist Award** for the year 2020 by *Shanghai Science and Technology Commission, China*.
- Name appears in Marquis **Who's Who in the World** in *Science & Engineering* 2019-20.
- Awarded with **Outstanding Reviewer Recognition** by Elsevier in March 2020.
- Awarded with **Best Poster Presentation Award** in *International Conference on Strongly Correlated Electron Systems & Nanotechnology*, Jan 2019.
- Awarded with **Best Researcher Award** for the year 2018-19 by NUST.
- Awarded with **Best Teacher Award** for the year 2017-18 by NUST.
- Awarded with fully funded **Foreign Doctorate Scholarship** by *Higher Education Commission*.
- Awarded with **Merit Scholarships on securing distinctions** in each academic semester.

### **Research Interests:**

- Development of sustainable construction materials
- Bio influenced self-healing cementitious materials
- Utilization of nanomaterials in cement-based composites
- Sensing and monitoring techniques for structural health monitoring
- Post-elevated temperature performance of cement-based composites
- Development of self-sensing and self-healing cement-based composites
- Energy efficient buildings
- Net zero energy buildings

## **II. Secured Research & Industry Grants (200.45 M PKR)**

Sr.	Title of Project	Duration	Role	Budget (Million PKR)	Funding Agency/Scheme
1.	Managing Future Heatwave Risk in India and Pakistan	2023-2026	Co-Principal Investigator	152.38	IDRC, FCDO UK
2.	Seismic Performance Evaluation of low-rise Buildings made with	2021-2023	Co-Principal	7.185	HEC Pakistan-NRPU

	Interlocking Compressed Earth Blocks		Investigator		
3.	Study on the synthesis mechanism and strength formation mechanism of magnesium-calcium oxy-sulfate cement based on desulfurization gypsum	2020-2022	Principal Investigator	9.36	Shanghai Science and Technology Committee, China- The Belt and Road Initiative
4.	Smart nano-coatings for the extended service life of paved concrete surfaces	2019-2021	Principal Investigator	14.45	HEC Pakistan-NRPU
5.	Development and characterization of crack resistant environment friendly and sustainable cementitious composites with enhanced strength and ductility	2019-2021	Co-Principal Investigator	9.06	HEC Pakistan-NRPU
6.	Study & Solution of Damaged Foundation of Siemens Steam Turbine G13 for 415 MW CCPP TPS Guddu	2020	Principal Investigator	2.3	NESPAK-Pakistan
7.	Testing of EPS Panels	2020	Principal Investigator	0.46	Sukh Chayne Project by EPS Solutions-Pakistan
8.	Performance evaluation of BAU-panels	2020	Principal Investigator	0.3	SHS Projects-Pakistan
9.	Retrofitting of OHWT at falcon complex, Rawalpindi	2020	Co-Principal Investigator	1	PAF Housing Directorate-Pakistan
10.	Non-Destructive Testing of Royal Airport Services Building – New Islamabad Intl, Airport	2020	Co-Principal Investigator	0.35	Royal Airport services-Pakistan
11.	Settlement of dispute in relation to design of the weir structure being constructed for 102 MWs hydro power project at Gulpur in between DAELIM & Mira Power after comprehensive technical and financial evaluation	2019	Co-Principal Investigator	1.3	NESPAK-Pakistan

12.	Structural health assessment of fire damaged IFC Building in Awami Markaz – Islamabad	2018	Principal Investigator	0.7	NESPAK-Pakistan
13.	Material and component level structural evaluation of Baltit Fort – Hunza	2018	Co-Principal Investigator	0.7	AIT Thailand
14.	Field application of self-compacting concrete	2015-2016	Co-Principal Investigator	0.9	Bestway-Pakistan

### III. Refereed SCI Journal Papers (cumulative IF=353.117)

Sr.	Publication	IF
1.	M.T. Afzal, <b>R.A. Khushnood</b> , W. Ahmed, An Experimental Investigation on Assessment of Residual Mechanical Performance of Basalt Fiber Reinforced High Strength Concrete at Elevated Temperature, <i>Fire Technol.</i> 2022. (2022) 1–24. doi:10.1007/S10694-022-01279-2.	2.276
2.	A. Khalid, <b>R.A. Khushnood</b> , S. Ali Memon, Pyrolysis as an alternate to open burning of crop residue and scrap tires: Greenhouse emissions assessment and mechanical performance investigation in concrete, <i>J. Clean. Prod.</i> 365 (2022) 132688. doi:10.1016/J.JCLEPRO.2022.132688.	11.072
3.	H.S. Ullah, <b>R.A. Khushnood</b> , J. Ahmad, F. Farooq, Predictive modelling of sustainable lightweight foamed concrete using machine learning novel approach, <i>J. Build. Eng.</i> 56 (2022) 104746. doi:10.1016/J.JOBE.2022.104746.	7.144
4.	H. Sardar, <b>R.A. Khushnood</b> , W. Khaliq, H.A. Khan, M.F. Saleem, Influence of pyrolytic waste tire residue on the residual performance of high strength concrete exposed to elevated temperatures, <i>J. Build. Eng.</i> 54 (2022) 104657. doi:10.1016/J.JOBE.2022.104657.	7.144
5.	H.S. Ullah, <b>R.A. Khushnood</b> , F. Farooq, J. Ahmad, N.I. Vatin, D.Y.Z. Ewais, Prediction of Compressive Strength of Sustainable Foam Concrete Using Individual and Ensemble Machine Learning Approaches, <i>Mater.</i> 2022, Vol. 15, Page 3166. 15 (2022) 3166. doi:10.3390/MA15093166.	3.748
6.	M. Kanwal, <b>R.A. Khushnood</b> , M. Shahid, A.G. Wattoo, An integrated and eco-friendly approach for corrosion inhibition and microstructural densification of reinforced concrete by immobilizing <i>Bacillus subtilis</i> in pyrolytic sugarcane-bagasse, <i>J. Clean. Prod.</i> 355 (2022) 131785. doi:10.1016/j.jclepro.2022.131785.	11.072
7.	<b>R.A. Khushnood</b> , A.M. Ali, M. Faraz Bhatti, H. Ahmed Khan, Self-healing fungi concrete using potential strains <i>Rhizopus oryzae</i> and <i>Trichoderma longibrachiatum</i> , <i>J. Build. Eng.</i> 50 (2022) 104155. doi:10.1016/J.JOBE.2022.104155.	7.144
8.	Q. Ullah, <b>R.A. Khushnood</b> , S. Ahmad, M. Usman, S. Muhammad, J.M. Tulliani, Performance Evaluation of MWCNTs Reinforced Cement Mortar Composites using Natural and Commercial Surfactants, <i>J. Wuhan Univ. Technol. Sci. Ed.</i> 2022 371. 37 (2022) 47–57. doi:10.1007/S11595-022-2498-Y.	1.127

9.	N. Shaheen, <b>R.A. Khushnood</b> , M.A. Musarat, W.S. Alaloul, Self-Healing Nano-Concrete for Futuristic Infrastructures: A Review, Arab. J. Sci. Eng. 47 (2022) 5365–5375. doi:10.1007/S13369-022-06562-6/TABLES/1.	2.621
10.	<b>R.A. Khushnood</b> , A. Arif, N. Shaheen, A.G. Zafar, T. Hassan, M. Akif, Bio-inspired self-healing and self-sensing cementitious mortar using Bacillus subtilis immobilized on graphitic platelets, Constr. Build. Mater. 316 (2022) 125818. doi:10.1016/J.CONBUILDMAT.2021.125818.	7.693
11.	S.A. Khokhar, T. Ahmed, <b>R.A. Khushnood</b> , S.M. Ali, Shahnawaz, A Predictive Mimicker of Fracture Behavior in Fiber Reinforced Concrete Using Machine Learning, Mater. 2021, Vol. 14, Page 7669. 14 (2021) 7669. doi:10.3390/MA14247669.	3.748
12.	M. Kanwal, <b>R.A. Khushnood</b> , W. Khaliq, A.G. Wattoo, T. Shahid, Synthesis of pyrolytic carbonized bagasse to immobilize Bacillus subtilis; application in healing micro-cracks and fracture properties of concrete, Cem. Concr. Compos. 126 (2022) 104334. doi:10.1016/j.cemconcomp.2021.104334.	9.93
13.	M. Ullah, S.B.A. Imtiaz, <b>R.A. Khushnood</b> , E. Pervaiz, W. Ahmed, A. Ullah, Z.A. Qureshi, Synthesis, characterization and application of graphene oxide in self consolidating cementitious systems, Constr. Build. Mater. 296 (2021) 123623. doi:10.1016/j.conbuildmat.2021.123623.	7.693
14.	N. Shaheen, S.A. Rizwan, <b>R.A. Khushnood</b> , T.A. Bier, Mechanical and energy performance of variably cured effective microorganisms cementitious composite designed via Taguchi, J. Clean. Prod. 310 (2021) 127350. doi:10.1016/j.jclepro.2021.127350.	11.072
15.	S.A. Memon, U. Javed, M. Haris, <b>R.A. Khushnood</b> , J. Kim, Incorporation of Wheat Straw Ash as Partial Sand Replacement for Production of Eco-Friendly Concrete, Mater. 2021, Vol. 14, Page 2078. 14 (2021) 2078. doi:10.3390/MA14082078.	3.748
16.	N. Shaheen, A. Jalil, F. Adnan, <b>R.A. Khushnood</b> , Isolation of alkaliphilic calcifying bacteria and their feasibility for enhanced CaCO <sub>3</sub> precipitation in bio-based cementitious composites, (2021) 1–16. doi:10.1111/1751-7915.13752.	6.575
17.	M.T. Afzal, <b>R.A. Khushnood</b> , Influence of carbon nano fibers (CNF) on the performance of high strength concrete exposed to elevated temperatures, Constr. Build. Mater. (2020) 121108. doi:10.1016/j.conbuildmat.2020.121108.	7.693
18.	A. Akbar, K.M. Liew, F. Farooq, <b>R.A. Khushnood</b> , Exploring mechanical performance of hybrid MWCNT and GNMP reinforced cementitious composites, Constr. Build. Mater. 267 (2021) 120721. doi:10.1016/J.CONBUILDMAT.2020.120721.	7.693
19.	M. Sadiq, <b>R.A. Khushnood</b> , M. Ilyas, W. Khaliq, S.A. Khan, P. Rong, Comparative assessment of impact analysis methods applied to large commercial aircraft crash on reinforced concrete containment, PLoS One. 15 (2020) e0237264. doi:10.1371/JOURNAL.PONE.0237264.	3.752
20.	M. Sadiq, W. Khaliq, M. Ilyas, <b>R.A. Khushnood</b> , S.A. Khan, P. Rong, Analysis of full-scale aircraft impact to reinforced concrete and steel plate reinforced concrete multiple barriers protecting nuclear power plants, Structures. 27 (2020) 732–746. doi:10.1016/J.ISTRUC.2020.06.030.	4.01
21.	E.U. Khan, <b>R.A. Khushnood</b> , W.L. Baloch, Spalling sensitivity and mechanical response of an ecofriendly sawdust high strength concrete at elevated temperatures, Constr. Build. Mater. 258 (2020) 119656. doi:10.1016/J.CONBUILDMAT.2020.119656.	7.693
22.	H.W. Iqbal, <b>R.A. Khushnood</b> , W. Latif Baloch, A. Nawaz, R.F. Tufail, Influence of graphite nano/micro platelets on the residual performance of high strength concrete exposed to elevated temperature, Constr. Build. Mater. 253 (2020) 119029. doi:10.1016/J.CONBUILDMAT.2020.119029.	7.693

23.	M.S. Zafar, U. Javed, <b>R.A. Khushnood</b> , A. Nawaz, T. Zafar, Sustainable incorporation of waste granite dust as partial replacement of sand in autoclave aerated concrete, <i>Constr. Build. Mater.</i> 250 (2020) 118878. doi:10.1016/J.CONBUILDMAT.2020.118878.	7.693
24.	M. Rauf, W. Khaliq, <b>R.A. Khushnood</b> , I. Ahmed, Comparative performance of different bacteria immobilized in natural fibers for self-healing in concrete, <i>Constr. Build. Mater.</i> 258 (2020) 119578. doi:10.1016/j.conbuildmat.2020.119578.	7.693
25.	U. Javed, <b>R.A. Khushnood</b> , S.A. Memon, F.E. Jalal, M.S. Zafar, Sustainable incorporation of lime-bentonite clay composite for production of ecofriendly bricks, <i>J. Clean. Prod.</i> 263 (2020) 121469. doi:10.1016/J.JCLEPRO.2020.121469.	11.072
26.	F. Farooq, S.K.U. Rahman, A. Akbar, <b>R.A. Khushnood</b> , M.F. Javed, R. alyousef, H. alabduljabbar, F. aslam, A comparative study on performance evaluation of hybrid GNPs/CNTs in conventional and self-compacting mortar, <i>Alexandria Eng. J.</i> 59 (2020) 369–379. doi:10.1016/J.AEJ.2019.12.048.	6.626
27.	F. Farooq, A. Akbar, <b>R.A. Khushnood</b> , W.L.B. Muhammad, S.K.U. Rehman, M.F. Javed, Experimental Investigation of Hybrid Carbon Nanotubes and Graphite Nanoplatelets on Rheology, Shrinkage, Mechanical, and Microstructure of SCCM, <i>Mater.</i> 2020, Vol. 13, Page 230. 13 (2020) 230. doi:10.3390/MA13010230.	3.752
28.	W. Hassan, M. Kanwal, N. Nawaz, H.Y. Ilyas, H. Haider, <b>R.A. Khushnood</b> , A.G. Wattoo, Mechanical properties of recycled coarse aggregate beams reinforced with steel fibers, <i>Int. J. Sci. Eng. Res.</i> 11 (2020) 1172–1179.	4.9
29.	S. Afgan, <b>R.A. Khushnood</b> , S.A. Memon, N. Iqbal, Development of structural thermal energy storage concrete using paraffin intruded lightweight aggregate with nano-refined modified encapsulation paste layer, <i>Constr. Build. Mater.</i> 228 (2019) 116768. doi:10.1016/J.CONBUILDMAT.2019.116768.	7.693
30.	A. Mahmood, <b>R.A. Khushnood</b> , M. Zeeshan, Pyrolytic carbonaceous reinforcements for enhanced electromagnetic and fracture response of cementitious composites, <i>J. Clean. Prod.</i> 248 (2020) 119288. doi:10.1016/J.JCLEPRO.2019.119288.	11.072
31.	<b>R.A. Khushnood</b> , Z.A. Qureshi, N. Shaheen, S. Ali, Bio-mineralized self-healing recycled aggregate concrete for sustainable infrastructure, <i>Sci. Total Environ.</i> (2019) 135007. doi:10.1016/j.scitotenv.2019.135007.	10.753
32.	M. Fawad, K. Kalman, <b>R.A. Khushnood</b> , M. Usman, Retrofitting of damaged reinforced concrete bridge structure, <i>Procedia Struct. Integr.</i> 18 (2019) 189–197. doi:10.1016/J.PROSTR.2019.08.153.	-
33.	N. Shaheen, <b>R.A. Khushnood</b> , W. Khaliq, H. Murtaza, R. Iqbal, M.H. Khan, Synthesis and characterization of bio-immobilized nano/micro inert and reactive additives for feasibility investigation in self-healing concrete, <i>Constr. Build. Mater.</i> 226 (2019) 492–506. doi:10.1016/J.CONBUILDMAT.2019.07.202.	7.693
34.	A. Khalid, <b>R.A. Khushnood</b> , A. Mahmood, Impact of pyrolytic carbonaceous nano inerts addition on fracture and electromagnetic interference shielding characteristics of cementitious composites, <i>Theor. Appl. Fract. Mech.</i> 103 (2019) 102320. doi:10.1016/j.tafmec.2019.102320.	4.374
35.	<b>R.A. Khushnood</b> , A. Nawaz, Effect of adding graphite nano/micro platelets on salt freeze-thaw resistance of nano-modificent concrete, <i>Mater. Res. Express.</i> 6 (2019) 095023. doi:10.1088/2053-1591/AB2D86.	2.025
36.	A. Aseem, W. Latif Baloch, <b>R.A. Khushnood</b> , A. Mushtaq, Structural health assessment of fire damaged building using non-destructive testing and micrographical forensic analysis: A case study, <i>Case Stud. Constr. Mater.</i> 11 (2019) e00258. doi:10.1016/J.CSCM.2019.E00258.	4.934

37.	S.A. Memon, S.F.A. Shah, <b>R.A. Khushnood</b> , W.L. Baloch, Durability of sustainable concrete subjected to elevated temperature – A review, <i>Constr. Build. Mater.</i> 199 (2019) 435–455. doi:10.1016/J.CONBUILDMAT.2018.12.040.	7.693
38.	S.A. Memon, U. Javed, <b>R.A. Khushnood</b> , Eco-friendly utilization of corncob ash as partial replacement of sand in concrete, <i>Constr. Build. Mater.</i> 195 (2019) 165–177. doi:10.1016/J.CONBUILDMAT.2018.11.063.	7.693
39.	<b>R.A. Khushnood</b> , S. ud din, N. Shaheen, S. Ahmad, F. Zarrar, Bio-inspired self-healing cementitious mortar using <i>Bacillus subtilis</i> immobilized on nano-/micro-additives:, <i>J. Intell. Mater. Syst. Struct.</i> 30 (2018) 3–15. doi:10.1177/1045389X18806401.	2.774
40.	W.L. Baloch, <b>R.A. Khushnood</b> , W. Khaliq, Influence of multi-walled carbon nanotubes on the residual performance of concrete exposed to high temperatures, <i>Constr. Build. Mater.</i> 185 (2018) 44–56. doi:10.1016/J.CONBUILDMAT.2018.07.051.	7.693
41.	<b>R.A. Khushnood</b> , S. Muhammad, S. Ahmad, J.M. Tulliani, M.U. Qamar, Q. Ullah, S.A. Khan, A. Maqsoom, Theoretical and experimental analysis of multifunctional high performance cement mortar matrices reinforced with varying lengths of carbon fibers, <i>Mater. Construcción.</i> 68 (2018) e172–e172. doi:10.3989/MC.2018.09617.	2.772
42.	M. Usman, A.Y. Khan, S.H. Farooq, A. Hanif, S. Tang, <b>R.A. Khushnood</b> , S.A. Rizwan, Eco-friendly self-compacting cement pastes incorporating wood waste as cement replacement: A feasibility study, <i>J. Clean. Prod.</i> 190 (2018) 679–688. doi:10.1016/J.JCLEPRO.2018.04.186.	11.072
43.	A. Rasheed, S.H. Farooq, M. Usman, A. Hanif, N.A. Khan, <b>R.A. Khushnood</b> , Structural reliability analysis of superstructure of highway bridges on China-Pakistan Economic Corridor (CPEC): a case study, <i>J. Struct. Integr. Maint.</i> 3 (2018) 197–207. doi:10.1080/24705314.2018.1492665.	1.75
44.	M. Azmat, M.U. Qamar, S. Ahmed, M.A. Shahid, E. Hussain, S. Ahmad, <b>R.A. Khushnood</b> , Ensembling Downscaling Techniques and Multiple GCMs to Improve Climate Change Predictions in Cryosphere Scarcely-Gauged Catchment, <i>Water Resour. Manag.</i> 32 (2018) 3155–3174. doi:10.1007/S11269-018-1982-9/FIGURES/6.	4.426
45.	A. Khalid, R.A. Khushnood, A. Mahmood, G.A. Ferro, S. Ahmad, Synthesis, characterization and applications of nano/micro carbonaceous inerts: A review, <i>Procedia Struct. Integr.</i> 9 (2018) 116–125. doi:10.1016/J.PROSTR.2018.06.019.	-
46.	N. Shaheen, <b>R.A. Khushnood</b> , S. Ud din, Bioimmobilized Limestone Powder for Autonomous Healing of Cementitious Systems: A Feasibility Study, <i>Adv. Mater. Sci. Eng.</i> 2018 (2018) 1–9. doi:10.1155/2018/7049121.	2.098
47.	W.L. Baloch, <b>R.A. Khushnood</b> , S.A. Memon, W. Ahmed, S. Ahmad, Effect of Elevated Temperatures on Mechanical Performance of Normal and Lightweight Concretes Reinforced with Carbon Nanotubes, <i>Fire Technol.</i> 54 (2018) 1331–1367. doi:10.1007/S10694-018-0733-Z/TABLES/8.	3.605
48.	F. Waheed, W. Khaliq, <b>R.A. Khushnood</b> , High-Temperature Residual Strength and Microstructure in Air-Entrained High-Strength Concrete, <i>ACI Mater. J.</i> 115 (2018) 425–435. doi:10.14359/51702037.	1.661
49.	H.M. Rashid, S.A. Khan, <b>R.A. Khushnood</b> , J. Ahmad, Lateral Load Performance Analysis of Dhajji Dewari Using Different Infills, <i>Int. J. Strateg. Eng.</i> 1 (2018) 1–12. doi:10.4018/IJOSE.2018070101.	-
50.	A. Khitab, S. Ahmad, M.J. Munir, S.M.S. Kazmi, T. Arshad, <b>R.A. Khushnood</b> , Synthesis and applications of nano titania particles: A review, <i>Rev. Adv. Mater. Sci.</i> 53 (2018) 90–105. doi:10.1515/RAMS-2018-0007/MACHINEREREADABLECITATION/RIS.	5.028



51.	W. Ahmed, <b>R.A. Khushnood</b> , S.A. Memon, S. Ahmad, W.L. Baloch, M. Usman, Effective use of sawdust for the production of eco-friendly and thermal-energy efficient normal weight and lightweight concretes with tailored fracture properties, <i>J. Clean. Prod.</i> 184 (2018) 1016–1027. doi:10.1016/J.JCLEPRO.2018.03.009.	11.072
52.	A. Shamim, S. Ahmad, A. Khitab, W. Anwar, <b>R.A. Khushnood</b> , M. Usman, Applications of Nano Technology in Civil Engineering: A Review, <i>Int. J. Strateg. Eng. 1</i> (2018) 48–64. doi:10.4018/IJOSE.2018010104.	-
53.	A. Khitab, S. Ahmad, <b>R.A. Khushnood</b> , S.A. Rizwan, G.A. Ferro, L. Restuccia, M. Ali, I. Mehmood, Fracture toughness and failure mechanism of high performance concrete incorporating carbon nanotubes, <i>Frat. Ed Integrita Strutt.</i> 11 (2017) 238–248. doi:10.3221/IGF-ESIS.42.26.	1.188
54.	S.K.U. Rehman, Z. Ibrahim, S.A. Memon, M.F. Javed, <b>R.A. Khushnood</b> , A Sustainable Graphene Based Cement Composite, <i>Sustain.</i> 2017, Vol. 9, Page 1229. 9 (2017) 1229. doi:10.3390/SU9071229.	3.889
55.	A.S. Afify, S. Ahmad, <b>R.A. Khushnood</b> , P. Jagdale, J.M. Tulliani, Elaboration and characterization of novel humidity sensor based on micro-carbonized bamboo particles, <i>Sensors Actuators B Chem.</i> 239 (2017) 1251–1256. doi:10.1016/J.SNB.2016.09.130.	9.221
56.	M.U. Qamar, M. Azmat, M.J.M. Cheema, M.A. Shahid, <b>R.A. Khushnood</b> , S. Ahmad, Model swapping: A comparative performance signature for the prediction of flow duration curves in ungauged basins, <i>J. Hydrol.</i> 541 (2016) 1030–1041. doi:10.1016/J.JHYDROL.2016.08.012.	6.708
57.	M.U. Qamar, D. Ganora, P. Claps, M. Azmat, M.A. Shahid, <b>R.A. Khushnood</b> , Flow duration curve regionalization with enhanced selection of donor basins, <i>J. Appl. Water Eng. Res.</i> 6 (2016) 70–84. doi:10.1080/23249676.2016.1196621.	-
58.	<b>R.A. Khushnood</b> , S. Ahmad, L. Restuccia, C. Spoto, P. Jagdale, J.M. Tulliani, G.A. Ferro, Carbonized nano/microparticles for enhanced mechanical properties and electromagnetic interference shielding of cementitious materials, <i>Front. Struct. Civ. Eng.</i> 2016 102. 10 (2016) 209–213. doi:10.1007/S11709-016-0330-5.	3.252
59.	F. Ahmed Najam, <b>R.A. Khushnood</b> , S. Ali Rizwan, Paradigms for Employing Interactive Computing Tools and Graphical User Interfaces (GUIs) in Structural Engineering Problems, <i>Int. J. Eng. Technol.</i> 8 (2016) 23–31. doi:10.7763/IJET.2016.V8.853.	-
60.	S. Ahmad, J.M. Tulliani, G.A. Ferro, <b>R.A. Khushnood</b> , L. Restuccia, P. Jagdale, Crack path and fracture surface modifications in cement composites, <i>Frat. Ed Integrita Strutt.</i> 9 (2015) 524–533. doi:10.3221/IGF-ESIS.34.58.	-
61.	<b>R.A. Khushnood</b> , S. Ahmad, G.A. Ferro, L. Restuccia, J.M. Tulliani, P. Jagdale, Modified fracture properties of cement composites with nano/micro carbonized bagasse fibers, <i>Frat. Ed Integrita Strutt.</i> 9 (2015) 534–542. doi:10.3221/IGF-ESIS.34.59.	-
62.	S. Ahmad, <b>R.A. Khushnood</b> , P. Jagdale, J.M. Tulliani, G.A. Ferro, High performance self-consolidating cementitious composites by using micro carbonized bamboo particles, <i>Mater. Des.</i> 76 (2015) 223–229. doi:10.1016/J.MATDES.2015.03.048.	9.417

63.	<b>R.A. Khushnood</b> , S. Ahmad, P. Savi, J.M. Tulliani, M. Giorcelli, G.A. Ferro, Improvement in electromagnetic interference shielding effectiveness of cement composites using carbonaceous nano/micro inerts, <i>Constr. Build. Mater.</i> 85 (2015) 208–216. doi:10.1016/J.CONBUILDMAT.2015.03.069.	7.693
64.	<b>R.A. Khushnood</b> , S.A. Rizwan, S.A. Memon, J.M. Tulliani, G.A. Ferro, Experimental Investigation on Use of Wheat Straw Ash and Bentonite in Self-Compacting Cementitious System, <i>Adv. Mater. Sci. Eng.</i> 2014 (2014). doi:10.1155/2014/832508.	2.098
65.	G.A. Ferro, S. Ahmad, <b>R.A. Khushnood</b> , L. Restuccia, J.M. Tulliani, Improvements in self-consolidating cementitious composites by using micro carbonized aggregates, <i>Frat. Ed Integrità Strutt.</i> 8 (2014) 75–83. doi:10.3221/IGF-ESIS.30.11.	-
66.	S.A. Memon, <b>R.A. Khushnood</b> , S. Khan, T.Y. Lo, Utilization of Pakistani bentonite as partial replacement of cement in concrete, <i>Constr. Build. Mater.</i> 30 (2012) 237–242. doi:10.1016/J.CONBUILDMAT.2011.11.021.	7.693

#### IV. Refereed Conference Papers

Sr.	Paper Title/Conference	Year
1.	M. Kanwal, <b>R.A. Khushnood</b> , A.G. Wattoo, Synthesis and comparative analysis of carbon-based nano/micro materials with activated carbon by using various characterization techniques, presented in 4th International Education and Innovative Sciences Symposium, Ankara, Turkey.	2021
2.	M. Kanwal, <b>R.A. Khushnood</b> , A.G. Wattoo, Effect of encapsulated bacillus bacteria on the durability of concrete: a review, presented in 4th International Nowruz Conference on Scientific Research, Karabagh, Azerbaijan.	2021
3.	M. Kanwal, <b>R.A. Khushnood</b> , A.G. Wattoo, Synthesis, and characterization of carbonized nano-micro materials from agricultural and Industrial wastes. Proceedings of 12 <sup>th</sup> International Exergy, Energy and Environment Symposium (IEEES-12), organized by Hamad Bin Khalifa University, Qatar.	2020
4.	F. Farooq, A. Akbar, <b>R.A. Khushnood</b> , Effect of Hybrid Carbon Nanotubes/Graphite Nano Platelets on Mechanical Properties of Cementitious Composite, 1st Conference on Sustainability in Civil Engineering, Capital University of Science and Technology, Islamabad, Pakistan.	2019
5.	A. Khalid, <b>R.A. Khushnood</b> , S. Saleem, S.Z. Farooq, N. Shaheen, Improving the mechanical properties of cementitious composites with graphite nano/micro platelets addition, IOP Conference Series: Materials Science and Engineering.	2018
6.	N. Shaheen, <b>R.A. Khushnood</b> , S.U. Din, A. Khalid, Influence of bio-immobilized limestone powder on self-healing behaviour of cementitious composites, IOP Conference Series: Materials Science and Engineering	2018

7.	S. Ahmad, <b>R.A. Khushnood</b> , P. Savi, Effects of multiwalled carbon nanotubes on the complex permittivity of cement composites. Proceeding of IET Brunei international conference on engineering and technology (BICET), Institut Teknologi Brunei, Brunei Darussalam.	2014
8.	F.A. Najam, S.A. Rizwan, <b>R.A. Khushnood</b> , Automation of a mix proportioning method developed for concretes with indigenous materials of Pakistan using knowledge based GUIs in MATLAB Proceeding of Advances in Chemically-Activated Materials CAM' 2014, RILEM Publications, Changsha, China.	2014
9.	P. Jagdale, S. Ahmad, <b>R.A. Khushnood</b> , J.M. Tulliani, A. Tagliaferro, G.A. Ferro. Bamboo based carbon material for improved mechanical properties of cement composite. XXIII International Materials Research Congress (IMRC), Cancun, Mexico.	2014
10.	S. Musso, <b>R.A. Khushnood</b> , G.A. Ferro, M. Pavese, Applications of Carbon nanotube/Cement Self-Sensing Nano-composite for Monitoring Stress and Strain downhole. Challenges in Nanoscience (ISACS 15), San Diego, USA	2014
11.	S. Ahmad, G.A. Ferro, A.Q. Bhatti, <b>R.A. Khushnood</b> , A. Arshad, Numerical modeling and simulation of a masonry arch in ANSYS subjected to impact loading. 72nd Annual Session of Pakistan Engineering Congress, Lahore, Pakistan.	2013
12.	<b>R.A. Khushnood</b> , G.A. Ferro, S. Ahmad, F.A. Najam. A comparative study on highway bridge barriers reinforced with steel and GFRP bars. 72nd Annual Session of Pakistan Engineering Congress, Lahore, Pakistan.	2013
13.	S. Ahmad, M. Usman, H.J. Jung, <b>R.A. Khushnood</b> , S.A. Rizwan, T.A. Bier. Artificial neural network (ANN) model for the prediction of the packing density of Lawrencepur sand. International Conference on Advanced Concrete Technology & Its Applications, Islamabad, Pakistan.	2012
14.	Z.A. Sabir, <b>R.A. Khushnood</b> , S. Ahmad, S.A. Rizwan, Environmental friendly material; economic and structural benefits of pervious concrete for sustainable construction. International Conference on Advanced Concrete Technology & Its Applications, Islamabad, Pakistan.	2012
15.	<b>R.A. Khushnood</b> , S. Ahmad, Z.A. Sabir, Retrofitting of existing columns of buildings and bridges using steel jacketing. 8th CCC, Durability of Concrete Structures, Plitvice Lakes, Croatia	2012
16.	<b>R.A. Khushnood</b> , S. Ahmad, Z.A. Sabir, Retrofitting of existing columns of buildings and bridges using FRP jacketing. 8th CCC, Durability of Concrete Structures, Plitvice Lakes, Croatia	2012

17.	M.H. Aslam, <b>R.A. Khushnood</b> , S. Ahmad Z.A. Sabir, Preparation of rapid hardening concrete using locally available additives/admixtures. 8th CCC, Durability of Concrete Structures, Plitvice Lakes, Croatia	2012
18.	<b>R.A. Khushnood</b> , T.B. Tahir, A. Raees, S. Ahmad, Possible utilization of Pakistani sugarcane bagasse ash as partial replacement of cement. 8th CCC, Durability of Concrete Structures, Plitvice Lakes, Croatia	2012
19.	<b>R.A. Khushnood</b> , S.A. Rizwan, T.A. Bier. Influence of incineration regimes on the pozzolanic properties of wheat straw ash for SCC/HPC. 7th European International Conference on Concrete Engineering, Budapest, Hungary	2011
20.	<b>R.A. Khushnood</b> , S.A. Rizwan, T.A. Bier. Locally available secondary raw materials for self-compacting cementitious systems. 7th European International Conference on Concrete Engineering, Budapest, Hungary	2011
21.	Z.A. Sabir, A. Aslam, <b>R.A. Khushnood</b> , S. Ahmad Earthquake resistant confined masonry structures with concrete beams and columns. International Conference on Earthquake Engineering and Seismology, Islamabad, Pakistan	2011

## V. Book Chapters

Sr.	Chapter	Year
1.	Kanwal M, Bagheri R, Wattoo A G, Irshad M I, <b>Khushnood R A</b> , Song Z. Biological Corrosion Inhibitors for Concrete, in: M.L. Inamuddin, Mohd Imran Ahamed, Rajender Boddula (Ed.), Theory Appl. Green Corros. Inhib., 86th ed., Materials Research Foundations: pp. 183–203. doi:10.21741/9781644901052-7.	2021
2.	Ahmed W, Baloch W L, <b>Khushnood R A</b> , Fire performance of concrete containing nano-fibers and graphite nano-particles, in: Smart Nanoconcretes Cem. Mater. Prop. Model. Appl., Elsevier Inc. pp. 297–311. doi:10.1016/B978-0-12-8178546.00012-X.	2019

## VI. Invited Lectures/Seminars

- “Paradigm shift towards outcome-based education”, Bahauddin Zakariya University, Multan, August 2019.
- “Assessment frameworks for psychomotor and affective domains- outcome based education”, COMSATS University, Islamabad, October 2019.
- “Nanotechnology Applications and Smart Materials for Improved Structural Performance”, NUST, Islamabad, August 2018.

- “Bio-inspired self-healing concrete using *Bacillus subtilis* immobilized on nano additives”, Superior University, Lahore, October 2018.
- “High performance self-compacting cementitious materials using nano/micro carbonaceous inerts”, Politecnico di Torino, Italy, May 2015.

## VII. International Conference Organization

1. Member of **Technical Evaluation Team** for 2<sup>nd</sup> International Conference on ‘Sustainability in Civil Engineering’ Capital University, Islamabad, August 2020.
2. Member of **Technical Evaluation Team** for 1<sup>st</sup> International Conference on ‘Sustainability in Civil Engineering’ Capital University, Islamabad, August 2019.
3. Member of **Organizing Team** for Two-Day International Seminar and Hands-on Training Workshop on ‘Seismic Performance and Health Assessment of Structures’ NUST, Islamabad, August 2018.
4. Member of **Organizing Team** for Two-Day International Seminar and Hands-on Training Workshop on ‘Design of Tall Buildings: Trends and Advancements for Structural Performance, April 2017.

## VIII. Editorial Activities

### Lead Editor of:

- ‘Sustainable Building Materials; Design and Digitization’ in Buildings-MDPI [IF: 3.324]
- Ultra-High-Performance Fiber-Reinforced Concrete: Design and Application for Sustainable Structures in Frontiers in Materials [IF:3.985]
- Predictive Modelling of Green Building Materials using Machine Learning in Materials-MDPI [IF: 3.748]

### Peer-reviewer for the following international journals:

- ACI Materials Journal (American Concrete Institute)
- ACI Structural Journal (American Concrete Institute)
- Advances in Materials Science and Engineering (Hindawi Publishing Corporation)
- Construction and Building Materials (Elsevier)
- Engineering Fracture Mechanics (Elsevier)
- Engineering Structures (Elsevier)
- Frattura e Integrità Strutturale (Italian Group of Fracture)
- International Journal of Solids and Structures (Elsevier)
- Journal of Building Engineering (Elsevier)
- Journal of Structural Engineering (ASCE Publications)
- Materials and Design (Elsevier)
- International Journal of Modelling and Simulation (Taylor and Francis)

- Materials and Structures (Springer)
- Structures (Elsevier)
- Journal of Cleaner Production (Elsevier)
- International Journal of Concrete Structures & Materials (Springer)
- **Peer-reviewer** of book proposals for Elsevier Science and Technology Books

## IX. Major Research Collaborations

My research unit collaborate with several research centers, universities, and institutions around the world and in Pakistan, including:

- Frattura e Integrità Strutturale (Italian Group of Fracture)
- School of Engineering and Digital Sciences, Nazarbayev University
- Civil Engineering Department, Ryerson University
- Institute of Ceramics, Glass and Construction Materials, Technische Universität Bergakademie Freiberg

## X. Thesis Supervised

Sr.	Thesis	Year
<b>PhD</b>		
1.	Nafeesa Shaheen, Self-healing concrete using innovative bio-inspired self-healing processes	2022
2.	Anum Khalid, Development of multifunctional smart concrete containing carbon based nano-intrusions	In process
3.	Maria Kanwal, Bio immune steel reinforced cementitious composites in corrosive environments	In process
4.	Junaid Shah Khan, Performance evaluation of low-rise buildings made with interlocking compressed earth bricks	In process
5.	Sajid Rasheed, Protection of steel rebars from corrosion with the help of bacteria and chemical biomimicry	In process
<b>Postgraduate</b>		
1.	Ali Raza, Digital image processing for precise evaluation of crack repair in concrete using bio-inspired strategies	2022
2.	Abdullah Iftikhar, Development and characterization of crack resistant eco-friendly and sustainable cementitious composites with enhanced strength and ductility	2022
3.	Malik Bahawal Shair, Development of light weight aggregate concrete and autoclaved aerated concrete using indigenous materials	2022
4.	Muhammad Imran, Compressive Strength Prediction of High Early Strength Concrete: An Integrated Framework of Artificial Neural Network and Genetic Algorithm Based Approach	2022
5.	Haji Sami Ullah, Predictive modelling of sustainable lightweight foamed concrete using machine learning novel approach	2022

6.	Hassan Amjad, Robustness of bacterial based self-healing concrete immobilized through sisal fibers	2022
7.	Hassan Sardar, Mechanical Properties of waste tire residue high strength concrete at elevated temperatures	2022
8.	Farhan Saleem, Enhanced Fire endurance of PCM embedded energy-efficient concrete using Melamine Formaldehyde encapsulation	2022
9.	Sajid Rasheed, Bio encapsulated steel embedded concrete with enhanced immunity for corrosion	2021
10.	Maha Sheikh, Mechanical properties and optimal design of green concrete incorporating waste glass powder based on Gene Expression Programming	2021
11.	Muhammad Rafay Iqbal, Predictive model development of bio-based self-healing concrete using Gene Expression Programming technique	2021
12.	Ahmed Mujtaba, Comparative analysis of bio-inspired self-healing concrete with distinct carbon based immobilizers	2021
13.	Muhammad Ateeb Ali, Self-healing fungi concrete using potential strains <i>Rhizopus oryzae</i> and <i>Trichoderma longibrachiatum</i>	2021
14.	Asim Sultan, Performance evaluation of bacterial self-healing concrete subjected to varied curing conditions	2021
15.	Muhammad Zuhair, Recycling of crystalline silicon based solar module waste in concrete	2021
16.	Muhammad Talal Afzal, Influence of carbon nano fibers (CNF) on the performance of high strength concrete exposed to elevated temperatures	2020
17.	Sajid Ghafar, Bridging of micro & macro cracks of infrastructure using microbially produced self-healing concrete by using nano graphitic and carbonaceous inert insertions	2019
18.	Hafiz Waheed Iqbal, Effect of elevated temperatures on mechanical and physical properties of high strength concrete modified with graphite nano/micro platelets	2019
19.	Muhammad Usman Javed, Sustainable incorporation of lime bentonite clay composite for production of eco-friendly bricks	2019
20.	Maria Kanwal, Bio-inspired techniques to enhance the immunity of reinforced concrete against corrosion	2019
21.	Muhammad Saeed Zafar, Sustainable incorporation of waste granite dust as partial replacement of sand in autoclaved aerated concrete	2019
22.	Momina Rauf, Bio-influenced self-healing concrete using various fibrous carriers	2019
23.	Ayesha Mahmood, Sustainable inert carbonized intrusions for intensification in fracture and electromagnetic properties of cementitious composites	2019
24.	Haseeb Taj, Applications of lightweight foam concrete in cold-formed steel construction	2018
25.	Urva Abid, Effect of particle size of local sugar cane bagasse ash on the response of self-compacting mortar systems	2018

26.	Muhammad Sadiq, Analysis of concrete structures against aircraft impact using ANSYS/LS-DYNA	2018
27.	Fahad Khan, Size effect analysis of steel-concrete bond strength	2018
28.	Siraj ud din, Bio-inspired self-healing cementitious mortar using Bacillus subtilis immobilized on nano/micro additives	2018
29.	Furqan Farooq, Self-compacting cement mortar using carbon nanotubes in conjunction with carbon nanoplatelets	2018
30.	Abdul Faheem, Salt freeze-thaw response of self-compacting mortar systems (SCMs) using super absorbent polymer (SAP) and secondary raw materials (SRMs)	2018
31.	Arslan Akbar, Nano modified multifunctional cementitious mortar with hybrid intrusion of CNTs/GNPs	2018
32.	Qareeb Ullah, Performance evaluation of multi-walled carbon nanotubes reinforced cement mortar matrices using commercial and natural dispersants	2017
33.	Wisal Ahmed, Effect of sawdust and lightweight aggregate on thermal and mechanical properties of concrete	2017
34.	Waqas Latif Baloch, Thermal and mechanical behavior of nanomodificent concrete at elevated temperatures	2017
35.	Taimur, The effect of high temperature on mechanical and material response of recycled aggregates high strength concrete	2017
36.	Shad Muhammad, Theoretical and experimental analysis of multifunctional high performance mortar matrices reinforced with varying lengths of carbon fibers	2017
37.	Farhan Waheed, Fire properties of high strength air entrained concrete	2017
38.	Abdul Mujeeb Khan, Performance of high strength concrete containing rice husk ash and bagasse ash at elevated temperatures	2017
39.	Sher Afghan, Macro-encapsulated phase change materials for the development of thermal energy storage light weight aggregate concrete in sustainable construction	2017
40.	Hafiz Muhammad Rasheed, Lateral load performance of Dhajji Dewari	2016
41.	Muhammad Shehzad Hassan, Behavior of reinforced concrete wide beams	2016
<b>Undergraduate</b>	(Session 2018-2022)	
1.	Sikandar Ali Khokhar (Group Leader), Touqeer Ahmed, Muhammad Umer basit and Shahnawaz, <i>Advancements in material and structural design of engineered cementitious composites (ECC) for its commercial implementation</i>	2022
2.	Muhammad Nauman Massom (Group Leader), Quratulain Karim, Irtaza Badar and Ahmer Naseer, <i>Development of modern base isolation using concept of metamaterials functional for low frequency seismic waves</i>	2022

## XI. Taught Courses

### M.S./Ph.D.



- Concrete Material Technology
- Advanced Structural Analysis
- Advance Concrete Design
- Nano-secrete in Concrete
- Finite Element Analysis
- Pre-stressed Concrete
- Special Topics in Civil Engineering

**B.E.**

- Engineering Mechanics
- Properties of Plain Concrete
- Reinforced Concrete Design
- Classical Methods of Structural analysis
- Modern Methods of Structural analysis

**Certification:**

I, the undersigned, certify that to the best of my knowledge and belief, these bio-data correctly describe me, my qualifications and experience.

RAO ARSALAN KHUSHNOOD

Date: 16/09/22

Signature (DD/MM/YY)