

Chandrashekhar Lakavath

Postdoctoral Fellow

- ✉ lakavathchandrashekhar@gmail.com
- 🌐 Google Scholar: citation 229, h-index 9
- 🌐 Research Website
- 🌐 Chandrashekhar Lakavath

Research Interest

- UHPC in Digital fabrication**  Green Concrete Metamaterial: Ultra-high performance concrete (UHPC), strain-hardening cementitious composites, and their applications in 3D printing. A comprehensive study on full-scale structural behavior, including flexural and shear performance of UHPC box-girders, biaxial bending behavior of UHPC columns, and structural optimization strategies for sustainable concrete design with accelerated construction.
- Structural Health Monitoring**  Smart infrastructure to monitor existing and new structure: Classification of crack types in concrete elements and developing an active health monitoring system using real-time data and existing Acoustic Emission (AE) database for critical structural elements.
- Fire behavior of structural elements**  Enhancing the fire resistance of UHPC concrete and understanding the damage levels of concrete elements post-fire event.

Education

- Oct. 2024 – Present  **Postdoctoral Researcher (PDF), McGill University, Montreal-Canada**
Structural Engineering
Research title: *Developing UHPC compression stress-strain model from flexural compression zone and structural optimization*
Advisor: Prof. Yi Shao
- July 2024 – Sep. 2024  **Post-Doctoral Researcher (PDF), Indian Institute of Technology, Hyderabad**
Structural Engineering
Research title: *Material characterisation of UHPFRC under fire loading condition*
Advisor: Prof. S Suriya Prakash
- Aug. 2022 – April 2023  **Fulbright Research Scholar, IOWA State University, Ames**
Structural Engineering
Research title: *Shear Behavior of post-tensioned UHPFRC I-girders with and without shear reinforcement*
Advisor: Prof. Sri Sritharan
- July 2019 – June 2024  **Doctor of Philosophy (Ph.D.), Indian Institute of Technology, Hyderabad**
Structural Engineering CGPA: 8.73/10
Thesis title: *Shear behavior of post-tensioned UHPFRC I-girders with and without shear reinforcement*
Advisor: Prof. S Suriya Prakash
- June 2016 – July 2018  **Master of Technology, S.V. National Institute Technology Surat, India**
Structural Engineering CGPA: 9.05/10
Thesis title: *Shear behavior of fiber reinforced prestressed concrete beams*
Advisor: Dr. B Kondrai Vendhan

Education (continued)

June 2011 – July 2015  **Bachelor of Technology, JNTUH College of Engineering Manthani, India**
Civil Engineering CGPA: 7.6/10
Project title: *Design and analysis of prestressed concrete bridge*
Advisor: Prof. Shivakonda Reddy

Fellowships

- June 2025  **FRQNT (B3X) Postdoctoral fellowship:** My research proposal and profile received an impressive score of 85.67 out of 100 and my application ranked first among all applicants for the postdoctoral fellowship of the 2025-2027 cycle.
- June 2024-May 2025  **NRC Research Associates Program by National Academics of Sciences, Engineering and Medicine to join Turner-Fairbank Highway Research Center | FHWA-US:** My research proposal and profile received an impressive score of 89.66 out of 100 in this postdoctoral fellowship evaluation. However, I chose to decline the opportunity due to the J-1 Visa home residency requirement associated with Fulbright sponsorship.
- August 2022 – April 2023  **Fulbright-Nehru Doctoral Research Fellowship,** Selected as one of 29 fellows out of 325 applicants for a prestigious program designed for Indian scholars pursuing a Ph.D. at an Indian institution. The fellowship brought together outstanding scholars from various disciplines, recognizing my academic excellence and potential for contribution to research.
- January 2021–July 2023  **Prime Minister's Research Fellowships(PMRF) Scheme,** Highly recognized research fellowship in India. It was selected based on various check points for selection including industrial experience, academic performance, research proposal and research publications. I was selected among
- July 2019–December 2020  **National Fellowship for Higher Education of Scheduled Castes and Scheduled Tribes (SC/ST) Students,** Awarded a fellowship by the Ministry of Tribal Affairs, Government of India, aimed at supporting economically disadvantaged students from SC and ST communities. I was selected under the ST category, reflecting the program's commitment to empowering scholars from underprivileged backgrounds.

Research Publications

Journal Articles

- 1 C. Lakavath, S. Pradumn, and S. S. Prakash, "Equivalent stress-block approach for moment-curvature behaviour of uhpc elements: Prestressed and non- prestressed beams," *Engineering Structures (Q1)*, Under review.
- 2 C. Lakavath, S. S. Prakash, and S. Sritharan, "Evaluation of minimum web reinforcement with different fiber contents for shear behavior of prestressed uhpfrc i shaped girders," *Journal of Bridge Engineering (Q1)*, Under Review.
- 3 M. S. V. Sagi, C. Lakavath, and S. S. Prakash, "Experimental assessment of strut width in self-consolidating fiber-reinforced concrete deep beams and its capacity estimation by unified cstm model," *Structural Concrete (Q1)*, Under Review.
- 4 C. Lakavath and S. S. Prakash, "Influence of fiber dosage, fiber type, and level of prestressing on the shear behaviour of uhpfrc i-girders," *Engineering Structures (Q1)*, vol. 300, p. 117 146, 2024, ISSN: 0141-0296.  DOI: <https://doi.org/10.1016/j.engstruct.2023.117146>.

- 5 C. Lakavath and S. S. Prakash, "Interface shear behavior of ultrahigh-performance fiber-reinforced concrete using digital image correlation technique," *Journal of Materials in Civil Engineering (Q1)*, vol. 36, no. 3, p. 04 023 589, 2024.  DOI: 10.1061/JMCEE7.MTENG-16817.
- 6 C. Lakavath and S. S. Prakash, "Tensile constitutive relationship of uhpfr from crack hinge based inverse analysis of notched beams," *Engineering Structures (Q1)*, vol. 318, p. 118 698, 2024, ISSN: 0141-0296.  DOI: <https://doi.org/10.1016/j.engstruct.2024.118698>.
- 7 C. Lakavath, S. S. Prakash, and S. Allena, "Tensile characteristics of ultra-high-performance fibre-reinforced concrete with and without longitudinal steel rebars," *Magazine of Concrete Research (Q2)*, vol. 76, no. 13, pp. 738–754, 2024.  DOI: 10.1680/jmacr.23.00181.
- 8 C. Lakavath, A. B. Bhosale, S. S. Prakash, and A. Sharma, "Effectiveness of hybrid fibers on the fracture and shear behavior of prestressed concrete beams," *Fibers (Q2) (Invited article)*, vol. 10, no. 3, 2022, ISSN: 2079-6439.  DOI: 10.3390/fib10030026.
- 9 M. S. V. Sagi, C. Lakavath, and S. S. Prakash, "Effect of steel fibers on the shear behavior of self-compacting reinforced concrete deep beams: An experimental investigation and analytical model," *Engineering Structures (Q1)*, vol. 269, p. 114 802, 2022, ISSN: 0141-0296.  DOI: <https://doi.org/10.1016/j.engstruct.2022.114802>.
- 10 C. Lakavath, M. S. V. Sagi, S. S. Joshi, and S. S. Prakash, "Finite element studies on the flexure-shear behavior of steel and hybrid fiber reinforced prestressed concrete beams," *Indian Concrete Journal (Q3) (Invited article)*, vol. 95, no. 1, pp. 58–70, 2021.
- 11 C. Lakavath, S. Suriya Prakash, and S. Dirar, "Experimental and numerical studies on shear behaviour of macro-synthetic fibre reinforced prestressed concrete beams," *Construction and Building Materials (Q1)*, vol. 291, p. 123 313, 2021, ISSN: 0950-0618.  DOI: <https://doi.org/10.1016/j.conbuildmat.2021.123313>.
- 12 M. S. V. Sagi, C. Lakavath, S. S. Prakash, and A. Sharma, "Experimental study on evaluation of replacing minimum web reinforcement with discrete fibers in rc deep beams," *Fibers (Q2) (Invited article)*, vol. 9, no. 11, 2021, ISSN: 2079-6439.  DOI: 10.3390/fib9110073.
- 13 S. Sahoo, C. Lakavath, and S. S. Prakash, "Experimental and analytical studies on fracture behavior of fiber-reinforced structural lightweight aggregate concrete," *Journal of Materials in Civil Engineering (Q1)*, vol. 33, no. 5, p. 04 021 074, 2021.  DOI: 10.1061/(ASCE)MT.1943-5533.0003680.
- 14 A. B. Bhosale, C. Lakavath, and S. Suriya Prakash, "Multi-linear tensile stress-crack width relationships for hybrid fibre reinforced concrete using inverse analysis and digital image correlation," *Engineering Structures (Q1)*, vol. 225, p. 111 275, 2020, ISSN: 0141-0296.  DOI: <https://doi.org/10.1016/j.engstruct.2020.111275>.
- 15 C. Lakavath, S. S. Joshi, and S. S. Prakash, "Investigation of the effect of steel fibers on the shear crack-opening and crack-slip behavior of prestressed concrete beams using digital image correlation," *Engineering Structures (Q1)*, vol. 193, pp. 28–42, 2019, ISSN: 0141-0296.  DOI: <https://doi.org/10.1016/j.engstruct.2019.05.030>.

Conference Proceedings

- 1 C. Lakavath, S. S. Prakash, A. Bambole, and G. Rai, "A case study on proof load test of distressed reinforced concrete flyover bridge," in *CARRS2023 at the Indian Institute of Technology Hyderabad – India*, 2024.
- 2 S. Pradumn B, C. Lakavath, and S. S. Prakash, "Simplified analytical approach for predicting the moment-curvature behavior of uhpc girders under flexure," in *CONSEC-IIT Madras*, 2024.
- 3 C. Lakavath, M. Singh, and S. S. Prakash, "Classifying failure modes of ultra-high-performance fiber reinforced concrete fracture beams using acoustic emission technique," in *IABSE Congress: Engineering for Sustainable Development, New Delhi, India, 20-22 September 2023*, Springer, 2023, pp. 1554–1560.  DOI: 10.2749/newdelhi.2023.1554.
- 4 C. Lakavath and S. S. Prakash, "Numerical study on shear behavior of uhpc concrete beams," in *76th RILEM week at the University of Kyoto - Japan*, 2022.
- 5 M. S. V. Sagi, C. Lakavath, and S. S. Prakash, "Numerical investigation on evaluation of minimum web-reinforcement provisions for shear design of rc deep beams," in *17WCEE -17th World Conference on Earthquake Engineering-Japan*, 2021.

- 6 C. Lakavath, A. Bhosale, and S. S. Prakash, "Experimental investigation on crack-arresting mechanism of steel fibre-reinforced concrete prism specimens using dic and ae techniques," in *Advances in Structural Engineering*, K. V. L. Subramaniam and M. A. Khan, Eds., Singapore: Springer Singapore, 2020, pp. 51–65, ISBN: 978-981-15-4079-0.
- 7 C. Lakavath, R. Allam, and B. Kondraivendhan, "Experimental and numerical studies on the behaviour of broad-gauge railway sleepers in static bending condition," in *Sustainable Construction and Building Materials: Select Proceedings of ICSCBM 2018*, Springer, 2019, pp. 781–792.
- 8 C. Lakavath, V. Pidapa, S. S. Joshi, *et al.*, "Shear behavior of steel fiber reinforced precast prestressed concrete beams," 2018.

Patents

- 1 C. Lakavath, S. S. Prakash, A. S. Ranjithkumar, and S. Allena, *A method to produce an ultra-high-performance fiber-reinforced concrete*. application no: 202341004954 a, date of filing:25/01/2023, and date of publication:26/07/2024.

Research Experience

October 2024- Present

Postdoctoral Fellow, McGill University - Canada

- Responsible for projects related to UHPC flexure, axial compression and structural optimization. I will be developing an optimization algorithm to develop sustainable UHPC structural elements. It includes simplified flexure and shear design approaches.

June 2024- September 2024

Postdoctoral Fellow, IIT Hyderabad - India

- Responsible for developing direct tension test setup and initialing research on UHPC under elevated temperature.

August 2022-March 2023

Fulbright Scholar, Iowa State University - USA

- My research focused on identifying the minimum shear reinforcement and optimal fiber volume and types for designing cost-effective I-girders. In the next phase, I plan to continue collaboration with Prof. Sri Srithran to conduct further investigations and propose enhancements to the existing UHPC shear design code provisions.

August 2018-July 2019

Project Assistant, Indian Institute of Technology Hyderabad - India

- Handled projects related to fiber reinforced concrete, and structural health monitoring of NHAI port-trust bridge - Vizag
- Developing self-consolidating fiber-reinforced concrete (SCFRC)
- Fracture behavior SCFRC such as fracture process zone using DIC technique
- Proof load testing of existing National Highway bridge

May 2017-August 2017

Intern, Indian Institute of Technology Hyderabad – India

- Assisting master students in casting and testing of prestressed fiber-reinforced concrete subjected to flexure loading condition
- Learned testing skills such as operating MTS system, and instrumentation details for deflection and strain measurement using DAQ

Industrial Experience

August 2015-July 2016	 Graduate Engineer Trainee, Patil Rail Infrastructure Pvt. Ltd. Hyderabad, India • Quality control of Indian Railway sleepers Manufacturing Process • Testing raw materials such as aggregates, cement and prestressing strands • Monitoring accelerated curing chambers and temperature control • Railways sleeper testing in static bending for quality assurance of each batch • I have plans to enhance the existing railway sleepers optimization to increase speed of locomotives. It will be once of my future research area.
June 2014-July 2014	 Intern, Axis Design Pvt. Ltd., Hyderabad- India • Design of Multi-Storied Building - Office work
May 2014	 Intern, Mantena Infra - India • Construction of High-Level River Bridge - Fieldwork • Post-tensioned concrete I girders reinforcement preparation inspection, concreting and post-tensioning and understanding site challenges in bridge construction • Pile foundation reinforcement cage preparation and concreting process
December 2013	 Intern, National Thermal Power Corporation (NTPC) Ramagundam - India • Roof Treatment of Existing Buildings - Fieldwork • Inspecting dam uplifting water collection method and flyash monitoring system
May 2013	 Intern, Sree Balaji Constructions Pvt. Ltd - India • Construction of educational buildings and understanding reading of engineering drawings and their implementation in the construction field.

Leadership contributions

Review Activities	
2024 - Till date	 Reviewer for Journal of Bridge Engineering - ASCE.
	 Reviewer for Engineering Structures- Elsevier.
	 Reviewer for Construction and Building Materials- Elsevier.
2023 - Till date	 Reviewer for Structural Journal - ACI.
	 Reviewer for Theoretical and Applied Fracture Mechanics - Elsevier.
	 Reviewer for Nuclear Engineering and Design - Elsevier.
	 Reviewer for Advances in Structural Engineering – Sage.
2021 - Till date	 Reviewer for Structures Journal – Elsevier.
Supervisory Activities	
July 2023 - June 2024	 Mentored a master's student at IIT Hyderabad for his thesis on 'Understanding the influence of different types of reinforcement on crack localization and it's moment-curvature behavior of UHPFRC in flexure'.
July 2024 - Till Date	 Mentoring a master's student at IIT Hyderabad for his thesis on 'Material characterization of UHPFRC at ambient and under elevated temperature'.

Leadership contributions (continued)

October 2024 - Till Date

- **Mentoring** a master's student at McGill University for his thesis on 'Flexural Behavior of Highly Reinforced Slender Ultra-high Performance Concrete (UHPC) Beams'.

Collaborations

-
- **Prof. Yi Shao**, McGill University -Canada: collaborating to research on flexure behavior of UHPC concrete to develop simplified analytical approach for flexure and it's structural optimization. We have mutual interest to continue research further on structural optimization of UHPC and Automation in concrete construction.
- **Prof. Sri Sritharan**, IOWA State University -USA: collaborating to research on shear behavior of UHPC concrete to propose a multiple components approach for predicting shear capacity of UHPC beams. The second phase research will be carried out in couple of months.
- **Dr. Samir Dirar**, University of Birmingham-UK: Collaborated to work on shear behavior of FRC prestressed beams and FE analysis.
- **Jn.-Prof. Dr.-Ing. Akanshu Sharma**, Purdue University-Lyles School of Civil Engineering-USA: My previous collaborations focused on the shear behavior of Fiber-Reinforced Concrete (FRC). Prof. Sharma has also expressed interest in continuing research on anchorage systems, specifically for designing anchorages in UHPC wind turbines. While I have not directly worked on anchorage systems, I have experience fabricating anchorage test setups and gained foundational knowledge through the GIAN course on anchorage design, offered by Prof. Sharma at IIT Hyderabad.
- **Dr. Srinivas Allena**, Cleveland State University-USA: Collaboratively developed UHPC mix design using locally available materials in India and the USA.
- **Dr. Anil Agarwal**, IIT Hyderabad-India: Collaboration work carried out on flexure behavior of Hollow core slabs and planned to extend collaborative work on UHPC. The aim of the research is to improve UHPC behavior under fire conditions to reduce spalling.
- **Potential collaborating industry partners**, Following industries are my potential collaborators.
 - UltraTech Cement**: I received sponsorship for my PhD research and established strong connections for potential future collaborations in my research.
 - Sika**: I received sponsorship and collaborated in developing High-Range Water Reducer Admixture (HRWRA) for UHPC (Master Glenium Sky 8880) during my PhD research.
 - SCON Infrastructure LLP and Utracon Structural Systems Pvt. Ltd**: One of the companies supplies post-tensioning materials in India. I have developed strong professional connections and am poised to initiate my research activities in this area.
 - Elkem Silicones**: They supplied micro-silica for my research. I have several ideas for enhancing UHPC for various applications, such as sprayable UHPC and grout applications for precast structures. This could potentially lead to further collaboration with Elkem.These industrial contacts will provide valuable opportunities for securing sponsorship and addressing real-time challenges faced by the industry.

Academic Achievements

- 2024 ■ **Best Ph.D. thesis award** By Indian Concrete Institute (ICI) - Best Ph.D. Thesis in Concrete Award.
- 2023 ■ **Award of excellence** in recognition as the overall third-place winner of the Engineering Student Design (Big Beam) Competition by PCI.

Academic Achievements (continued)

- 2021  **Award of excellence** in recognition as the overall second place winner of the UHPC student Competition-Third international interactive symposium on UHPC.
- 2021  **Best Poster presentation award** in 75th RILEM Annual week at Universidad Autonoma de Nuevo León, Mexico.
- 2020  **First prize in the PG-Research presentation** at INTER-IIT meet-up (CIVIL conclave 2021) organized by the Indian Institute of Technology Roorkee-India.
- 2020  **First prize in the PG-Research presentation** at INTER-IIT meet-up (CIVIL conclave 2020) organized by the Indian Institute of Technology Roorkee-India.
- 2014  **Third prize in the Essay Writing Competition** organized by IEI, Warangal Local Center on Engineers Day Celebrations.
-  **Second prize in the Paper-presentation** at the technical fest organized by Bomma College of Engineering and Technology (Bomma Premier league 2K14).
-  **Second prize in the JUNK-YARD** at technical fest organized by JNTUH College of Engineering Manthani (aavishkruth-2K14).
- 2013  **First prize in the paper presentation** at the technical fest organized by Sindhura College of Engineering and Technology (2K13).
-  **First prize in the Model-making competition** at the technical fest organized by JNTUH College of Engineering Manthani (aavishkruth-2K13).

Departmental Services

- Organized Events** 
- 2021  Civil Engineering Research Scholars Day (CERSD) at IIT Hyderabad for the first time and will be continued every year.
 - 2017  Organized a talk on "Quality control of concrete during the construction" at SV NIT-Surat.
 - 2014  Organized "AAVISHKRUTH-2K14" technical fest as core co-ordinate from the department of civil engineering.
 -  Organized "GRUHA NIRMAN" event in "AAVISHKRUTH-2k14".
 -  Worked as Departmental Editor of JNTUHCCEM Online College Magazine "DHIYON-AHA".

Professional committees and Membership

- 2023 - Till date  **Guest Member** of ACI 239-0C Structural design subcommittee.
-  **Member** of PCI UHPC Bridge Subcommittee.
- 2019 - Till date  **Student member** of ACI, PCI and ASCE.
- 2016 - Till date  **Associate member** of The Institute of Engineers Inda.

References

Prof. Suriya Prakash

Professor
Department of Civil Engineering,
Indian Institute for Technology-Hyderabad,
B-416, Telangana-502285, suriyap@iith.ac.in

Prof. Yi Shao

Assistant Professor of Civil Engineering
Department of Civil Engineering,
McGill University, 817 Sherbrooke Street West,
Macdonald Engineering Building, Montreal,
QC, Canada H3A 0C3, yi.shao2@mcgill.ca

Prof. Sri Sritharan

Anson Marston Distinguished Professor
Civil, Construction and Environmental Engineering,
Iowa State University, 376 Town Engr 813 Bissell Rd
Ames, IA 50011 – 1066, sri@iastate.edu

Dr.-Ing. Akanshu Sharma

Associate Professor of Civil Engineering
Lyles School of Civil and Construction Engineering,
Purdue University, 550 Stadium Mall Drive,
West Lafayette, IN 47907 – 2051, akanshu@purdue.edu