

Pranay Singh

+1-716-907-8354 212, Ketter Hall, Buffalo, NY 14260-4300 pranaysi@buffalo.edu

Education

University at Buffalo, State University of New York

December 2026

PhD in Civil Engineering

Buffalo, New York

- **Coursework (For credits):** Advanced Concrete Materials, Advanced Mechanics of Solids, Prestressed Concrete Design, Aseismic base isolation, Structural Reliability and Safety, Concrete Structures, Design of Structures for Fire
- **Coursework (Audited):** Advanced Design of Steel Structures, Molecular Modeling, Resilience of Civil Infrastructure Systems

Indian Institute of Technology (IIT) Patna

July 2021

M.Tech. in Civil Engineering

Patna, India

- **Coursework:** Advanced Engineering Mathematics, Earthquake Resistant Design of Structures, Finite Element Methods, Geotechnical Earthquake Engineering, Structural Dynamics.

Bhagalpur College of Engineering

July 2019

B.Tech. in Civil Engineering

Bhagalpur, India

- **Coursework:** Structural Analysis, Design of Concrete Structures, Design of Steel Structures, Environmental Engineering, Transportation Engineering, Soil Mechanics

Professional Experience

Indian Institute of Technology (IIT) Delhi

Aug 2022 – July 2023

Senior Project Scientist

Delhi, India

- Analyzed the mechanics of a series of recentering passive friction-based seismic isolation devices. Developed numerical models based on the mechanics of these devices.
- Developed a novel base isolation system with easier implementation and enhanced performance. The device can act as an alternative to existing isolation systems based on certain factors.

National Council for Cement and Building Materials (NCCBM), Ballabhgarh

Aug 2021 – Aug 2022

Project Engineer

Faridabaad, India

- Worked on research projects on advanced concrete materials primarily for achieving structural resilience and sustainability. Led the project components focusing on the analysis of the structural performance of non-conventional concrete materials.
- The projects include materials like ultra-high-performance concrete and fiber-reinforced concrete to achieve resilience in structures. One of the projects includes Geopolymer concrete, which is considered a greener alternative to conventional concrete and is a stepping stone in achieving carbon emission goals in the construction sector.

Projects

Mitigating cracks in concrete members for durable bridge construction | University at Buffalo, SUNY

- Investigated the effect of using steel wool to improve the fracture performance of reinforced concrete members.

Advanced concretes for girders with unbonded post tensioning strands | University at Buffalo, SUNY

- Established design guidelines for using Engineered Cementitious Composites(ECC), for flexural performance enhancement of post-tensioned girders.

3D printable advanced concrete materials for prestressed bridges | University at Buffalo, SUNY

- Developed and investigated a 3D printable Strain Hardening Cementitious Composite (SHCC) cover for mitigating the end zone cracking in pretensioned bridge girders.

Enhanced seismic isolation system | Indian Institute of Technology (IIT) Delhi

- Developed a novel base isolation system with easier implementation and enhanced performance. The device is supposed to act as an alternative to existing isolation systems based on certain factors.

Ultra high performance concrete (UHPC) from indigenous ingredients | National Council for Cement and Building Materials

- Developed High strength and Ultra High-performance concrete from indigenous available aggregates in India.

- Performed a series of analyses on the developed concrete mix for establishing standard provisions for its widespread applications.

Fracture performance and ductility enhancement of high strength concrete | *National Council for Cement and Building Materials*

- Improved the fracture behavior of conventional high-strength concrete using steel and hybrid fibers.
- Improved post-cracking ductility of high-strength concrete using steel and hybrid fibers.

Flexural and Shear performance of geopolymers concrete | *National Council for Cement and Building Materials*

- Developed a geopolymer concrete mix and analyzed its strength and fracture performance.
- Compared the shear and flexural performance of geopolymer concrete beams with conventional concrete beams. The results show promising behavior for the application of geopolymers in structural elements.

Roller compacted concrete for dams | *National Council for Cement and Building Materials*

- Assisted in analyzing the structural aspect of the roller compacted concrete mix for application in dam construction.

Temperature control and monitoring for mass concrete | *National Council for Cement and Building Materials*

- Assisted in analyzing the temperature monitoring data collected from the construction site for mass concreting in hot weather conditions.
- Proposed recommendations for mass concreting in hot weather conditions.

Shape memory alloy (SMA) dampers for adjacent buildings | *Indian Institute of Technology (IIT) Patna*

- Proposed a shape memory alloy damper-based system to mitigate the pounding risks and improve the structural response under seismic excitation.
- Established the system's efficiency by performing non-linear dynamic analysis under real seismic excitation with parametric variations.

Awards

1. Ministry of Human Resource and Development (MHRD), Government of India fellowship (2019-2021) for Masters study at Indian Institute of Technology (IIT) Patna, India.
2. Institute Silver Medal (2021) for highest CGPA in the Department of Civil and Environmental Engineering (DCEE), Indian Institute of Technology (IIT) Patna, India.
3. Graduate Assistantship (GA) by Institute of Bridge Engineering (IBE), University at Buffalo (2023-2024) for graduate studies at the University at Buffalo.
4. TU Dresden summer school participant 2024.
5. Travel grant recipient for ASU – Swinburne Workshop on Advances in Concrete 3D Printing 2025.
6. American Concrete Institute (ACI) travel stipend to attend for ACI concrete convention Fall 2025

Membership

1. American Concrete Institute (ACI)
2. RILEM
3. American Society for Civil Engineers (ASCE)
4. Precast Concrete Institute (PCI)
5. Fib international

Peer Review

Papers reviewed: 15 Journal articles,

1. Reviewer, Automation in Construction, Elsevier
2. Reviewer, Construction and Building Materials, Elsevier
3. Reviewer, Transportation Research Record, Sage Journals
4. Reviewer, Journal of Materials in Civil Engineering, American Society for Civil Engineers (ASCE)
5. Reviewer, Transportation Research Board (TRB) Annual meeting
6. Reviewer, Conference on Advancing Additive Manufacturing and Construction in Transportation (AAMCT), Irvine, CA
7. Reviewer, Digital Concrete (3DPCMS) Conference, Nanjing, China
8. Reviewer, Journal of Structural Integrity and Maintenance, Taylor and Francis

Sevices

1. Session moderator, Conference on Advancing Additive Manufacturing and Construction in Transportation (AAMCT), 2024, Irvine, CA
2. Member of Scientific Committee, Digital Concrete (3DPCMS) Conference, 2026, Nanjing, China

Technical Skills

Software Packages: ABAQUS, ANSYS, SAP2000, ETABS, OPENSEES

Programming Languages: Python, Java, Matlab

Concepts: Structural analysis and design under static and dynamic loads, Concrete mix design, Fresh and hardened property investigation on concrete materials, Microstructural investigation on concrete materials, 3d concrete printing, Artificial intelligence, Machine learning, Neural networks, High-performance computing, Data structures and algorithms (DSA), Low-level design (LLD) and High-level design (HLD) principles for scalable software development

Standardized test score

GRE: 332/340; Verbal Reasoning:162/170, Quantitative Reasoning: 170/170

TOEFL: 110/120; Reading:29/30, Listening:30/30, Speaking:26/30, Writing:25/30

Presentations/Talks

- [1] Pranay Singh. "Poster Presentation at the 3D Printing of Concrete Workshop". In: *3D Printing of Concrete Workshop*. Swinburne University of Technology and Arizona State University. Hawthorn, Australia, 2025.
- [2] Pranay Singh. "Printing Meets Precast: 3D-Printed Ductile Concrete Covers for Durable Bridge Girder Ends". In: *ACI Concrete Convention 2025*. Poster presentation. Baltimore, Maryland, USA, 2025.
- [3] Pranay Singh. "Title of RILEM Youth Symposium Presentation". In: *RILEM Youth Symposium 2025 (RYS2025)*. 2025.
- [4] Pranay Singh. "Title of TRB 2025 Presentation". In: *Transportation Research Board (TRB) Annual Meeting 2025*. Conference presentation. 2025.
- [5] Pranay Singh. "Title of ACI Concrete Convention 2024 Presentation". In: *ACI Concrete Convention*. Nov. 2024.
- [6] Pranay Singh. "Title of TRB AAMCT 2024 Presentation". In: *TRB AAMCT Conference*. Irvine, California, USA, 2024.
- [7] Pranay Singh, Venkateswara Swamy Gadde, Chi Zhou, Pinar Okumus, and Ravi Ranade. "3D printed advanced materials to mitigate prestressed concrete girder end cracks- material properties identification and mix tailoring". In: *103rd Transportation Research Board (TRB) Annual Meeting 2024*. Poster/Presentation. Washington, DC, USA, 2024.
- [8] Pranay Singh, Venkateswara Swamy Gadde, Chi Zhou, Pinar Okumus, and Ravi Ranade. "Development of 3D printable strain hardening cementitious composites for bridge-related applications". In: *Advancing Additive Manufacturing for Construction in Transportation (AAMCT) Conference*. Conference presentation. Irvine, CA , USA, 2024.
- [9] Pranay Singh, Dhiraj Sanjay Landge, Chi Zhou, Pinar Okumus, and Ravi Ranade. *3D-printed strain-hardening cementitious composites as permanent formwork for pretensioned concrete girders*. TU Dresden Summer School. Poster/Presentation. Dresden, Germany, 2024.
- [10] Pranay Singh, Chi Zhou, Pinar Okumus, and Ravi Ranade. "Development of 3D Printable Strain Hardening Cementitious Composites for Bridge Related Applications". In: *XI International Symposium on Fiber Reinforced Concrete (BEFIB 2024)*. Conference presentation. Dresden, Germany, 2024.

Publications

- [1] Pranay Singh, Venkateswara Swamy Gadde, Chi Zhou, Pinar Okumus, and Ravi Ranade. "3D printed advanced materials to mitigate prestressed concrete girder end cracks". In: *TRB 103rd Annual Meeting*. January,2024.
- [2] Pranay Singh, PN Ojha, Brijesh Singh, and Abhishek Singh. "Crack detection and crack segmentation in concrete beams undergoing mode I fracture using computer vision and convolutional neural network". In: *Canadian Journal of Civil Engineering* 50.5 (2023), pages 432–443.

- [3] Pranay Singh, Brijesh Singh, PN Ojha, Amit Trivedi, Abhishek Singh, and Chirag Pede. "Fracture behavior of slag & fly ash-based geopolymer concrete in comparison with opc-based conventional concrete, including the effect of steel and hybrid fibers". In: *Revista Ingeniería de Construcción* 38.2 (2023).
- [4] Sourav Gur, Koushik Roy, and Pranay Singh. "Seismic performance assessment of adjacent building structures connected with superelastic shape memory alloy damper and comparison with yield damper". In: *Structural Control and Health Monitoring* (2022), e2926.
- [5] PN Ojha, Sumit Kumar, Puneet Kaura, Brijesh Singh, and Pranay Singh. "Experimental investigation on effect of corrosion on curvature-ductility relationship of RCC member in flexure". In: *Journal of Building Materials and Structures* 9.1 (2022), pages 74–86.
- [6] PN Ojha, Amit Sagar, Brijesh Singh, Harish Sharma, and Pranay Singh. "Temperature Control and Monitoring For Mass Concrete in Raft under Hot Weather Condition -An Indian Case Study". In: *Sustainable Structures and Materials* 4.2 (2022), pages 19–28.
- [7] PN Ojha, Brijesh Singh, Shivam Prakash, Pranay Singhd, Manish K. Mandre, and Suresh Kumar. "Effect of high ratio fly ash on roller compacted concrete for dam construction". In: *Research on Engineering Structures and Materials* 8.2 (2022), pages 233–251.
- [8] PN Ojha, Brijesh Singh, and Pranay Singh. "Empirical equations for prediction of split tensile and flexural strength of high strength concrete including effect of steel fiber". In: *Research on Engineering Structures and Materials* (2022).
- [9] PN Ojha, Brijesh Singh, Pranay Singh, Abhishek Singh, and Manish Kumar Mandre. "Study on effect of fly ash and limestone powder on compressive strength of roller compacted concrete for dam construction". In: *Journal of Asian Concrete Federation* 8.1 (2022), pages 37–51.
- [10] PN Ojha, Brijesh Singh, Abhishek Singhd, and Piyush Mittal. "Fracture behavior of plain and fiber-reinforced high strength concrete containing high strength steel fiber". In: *Research on Engineering Structures and Materials* 8.3 (2022), pages 583–602.
- [11] PN Ojha, Brijesh Singh, Amit Trivedi, Pranay Singh, Abhishek Singh, and Chirag Pede. "Short-term mechanical performance and flexural behavior of reinforced slag-fly ash-based geopolymer concrete beams in comparison to OPC-based concrete beams". In: *Research on Engineering Structures and Materials* 9.1 (2022), pages 31–51.
- [12] PN Ojha, Pranay Singh, Brijesh Singh, and Abhishek Singh. "Fracture behavior of hybrid fiber reinforced normal strength and high strength concrete: comparison with plain and steel fiber reinforced concrete". In: *Research on Engineering Structures and Materials* 9.1 (2022), pages 243–262.
- [13] PN Ojha, Pranay Singh, Brijesh Singh, Abhishek Singh, Ajay ., and Amit Sagar. "Experimental and FEM Analysis for Fracture Performance Evaluation of Concrete Made with Recycled Construction and Demolition Waste Aggregates". In: *Periodica Polytechnica Civil Engineering* (2022).
- [14] PN Ojha, Pranay Singh, Brijesh Singh, Abhishek Singh, Amit Sagar, and Ravi Yadav. "Statistical Characteristics of compressive strength of Normal & High strength concrete and concrete made with recycled aggregate". In: *Revista Ingeniería de Construcción* 37.3 (2022).
- [15] Abhishek Singh, Brijesh Singh, PN Ojha, Amit Trivedi, and Pranay Singh. *Flexural and Fracture Performance of Geopolymer Concrete Cured at Ambient Condition*. 2022.
- [16] Brijesh Singh, Pranay Singh, PN Ojha, and Abhishek Singh. "Experimental study on stress-strain characteristics of ultra high strength concrete and its effect on stress block parameters for flexural design of building". In: *Research on Engineering Structures and Materials* 9.2 (2022), pages 503–525.
- [17] Pranay Singh, Sourav Gur, and Koushik Roy. "Seismic Performance of Coupled Buildings Connected by Yield and SMA Dampers". In: *ASPS Conference Proceedings*. Volume 1. 4. 2022, pages 1129–1137.
- [18] Pranay Singh, PN Ojha, Brijesh Singh, Piyush Mittal, and Abhishek Singh. "Experimental determination of stress-strain characteristics of very high strength unconfined concrete in compression including comparison with normal and high strength concrete". In: *Revista Ingeniería de Construcción* 37.3 (2022).

- [19] Amit Trivedi, Brijesh Singh, Abhishek Singh, PN Ojha, Pranay Singh, and Dinesh Kumar. "Shear behaviour of reinforced alkali activated slag and fly ash concrete under ambient curing: comparison with opc based concrete". In: *17th NCB International Conference on Cement, Concrete and Building Materials*. 2022.
- [20] PN Ojha, Pranay Singh, Brijesh Singh, Abhishek Singh, Amit Prakash, and Amit Sagar. "Stress-strain characteristics and energy absorption analysis of Construction and demolition waste recycled aggregate concrete in compression". In: *Sustainable Structures and Materials, An International Journal* 4.2 (2021), pages 29–43.
- [21] Sourav Gur, Pranay Singh, and Koushik Roy. "Seismic response of adjacent building structure connected with superelastic damper: comparison with yield damper". In: *EURODYN(2020), XI International Conference on Structural Dynamics*. 2020, pages 4696–4709.