Shashank Gupta

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Education

Princeton University — **Princeton, NJ**
Ph.D. in Civil and Environmental Engineering, GPA- 3.83/4 — *August 2021- May 2026*

Princeton University — **Princeton, NJ**
M. A. Civil and Environmental Engineering, GPA- 3.83/4 — *August 2021- May 2023*

Politecnico di Milano — **Milano, Italy**
M.Sc. Civil Engineering (Structures), GPA- 107/110 — *September 2018 – April 2021*

BITS Pilani, Hyderabad — **Hyderabad, India**
B.E. (Hons) Civil Engineering, CGPA- 9.36/10 — *August 2014 – July 2018*

Research and Professional Experience

Princeton University — **Princeton, NJ**
Incoming Postdoctoral Researcher — *Starting June 2026*

- Expected research focus: fluid–structure interaction, fracture mechanics, statistical mechanics, and digital fabrication of architected cementitious materials.

Princeton University — **Princeton, USA**
Research Assistantship — *June 2022 – May 2026*

Engaged in the following projects under the guidance of Prof. Reza Moini:

- Developing tough cortical bone-inspired architected cement-based materials
- Engineering tough and ductile nacre-inspired cementitious materials
- Investigating pore connectivity and fracture behavior in 3D-printed cementitious materials
- Optimizing low-embodied carbon concrete through aggregate and material selection

BITS Pilani, Hyderabad — **Hyderabad, India**
Research Assistant — *August 2020 – December 2020*

- Conducted durability assessments of alkali-activated binder concrete using reliability analysis and FEM modeling under the guidance of Prof. Arkamitra Kar.

Jaipur Metro Rail Corporation Ltd. — **Jaipur, India**
Summer Intern — *May 2016 – July 2016*

- Contributed to the development of a track maintenance monitoring system by analyzing metro track maintenance techniques and inspection schedules.

Scholarships, Honors, & Awards

Charlotte Elizabeth Procter Fellowship, Princeton University — *August 2025 – May 2026*

- Procter Fellowship is a Princeton Honorific fellowship that recognizes outstanding performance and professional promise, and represents high commendation from the Princeton University Graduate School. It

provides full tuition, health fees, and a premium stipend for the academic year of 2025–26.

Rising Stars in Materials Science and Engineering Workshop, UIUC *September 2025*

- Selected to participate in the Rising Stars Workshop, a highly competitive program jointly organized by CMU, MIT, Stanford University, and UIUC to identify and prepare exceptional early-career researchers for academic careers in Materials Science and related fields.

Schmidt Science Fellowship Nominee *June 2025*

- Selected as one of seven campus-wide nominees from Princeton University for the 2026 Schmidt Science Fellows Program, a globally competitive STEM postdoctoral fellowship administered by Schmidt Futures in partnership with the Rhodes Trust.

Prototypes for Humanity Expo, Dubai (Longlisted) *October 2025*

- Longlisted for the Prototypes for Humanity Exhibition, an international platform recognizing university innovations addressing real-world challenges.

Norman J. Sollenberger Fund Fellowship, Princeton University *AY 2021–22, 2022–23, & 2023–24*

- Named graduate fellowship supported by Sir Gordon Y.S. Wu, awarded to exceptional doctoral students. Provided full graduate support for three consecutive academic years (AY 2021–2024).

Silver Scholarship, Politecnico di Milano *September 2018 – April 2021*

- Merit-based scholarship covering full tuition for the duration of the Master's program. (Scholarship letter here)

ACCELNET 3D Concrete Travel Grant, C3 Symposium *August 2025*

- Received travel grant covering registration and accommodation to present research on 3D-printed architected cementitious materials at the C3 Symposium.

USNCCM18 Travel Award, U.S. National Congress on Computational Mechanics *July 2025*

- Awarded competitive travel funding to partially support presentation and participation at the 18th U.S. National Congress on Computational Mechanics.

First in Class – Department of Civil Engineering *August 2018*

- Graduated ranking 1st among Civil engineering students at BITS Pilani, Hyderabad.

Peer-Reviewed Journal Papers

(^) indicates work conducted at Princeton University.

16. Tough, Ductile, and Strong Hard-Soft Cementitious Composite Enabled by Multi-Material Additive Manufacturing (^)
A. Najmeddine, **S. Gupta**, W. Makinen, Z. Lin, K. Delnoce, R. Moini, *Advanced Materials* (IF - 26.8), April 2026
DOI - https://doi.org/10.1002/adma.202515461

15. Pore Connectivity and Arrangement in Additively Manufactured Cementitious Material (^)
S. Gupta, R. M. Ghantous, W. J. Weiss, R. Moini, *Cement and Concrete Research* (IF - 13.1), March 2026
DOI - https://doi.org/10.1016/j.cemconres.2026.108206

14. Reducing Global Warming Potential of Concrete Using Aggregate and Concrete Optimization (^)
S. Gupta, A. Strand, M. Adams, M. Bandelt, H. Wang, R. Moini, *Journal of Building Engineering* (IF - 7.4), March 2026
DOI - https://doi.org/10.1016/j.jobe.2026.115860

13. Prediction of the Behavior of Alkali Activated Concrete under Mechanical Loading using Second Order Reliability Method and Monte Carlo Simulation
P.G. Chottemada, **S. Gupta**, D. R. Chauhan, A. Kar, A. Unnikrishnan, *Structural Concrete* (IF - 3.3), June 2025
DOI - https://doi.org/10.1002/suco.70210

12. Coupled Large Deformation Phase-Field and Cohesive Zone Model for Crack Propagation in Hard-Soft Multi-Materials (^)
A. Najmeddine, **S. Gupta**, R. Moini, *Journal of the Mechanics and Physics of Solids* (IF - 6.0), March 2025.
DOI: https://doi.org/10.1016/j.jmps.2024.106016

11. Tough Cortical-bone Inspired Architected Cement-based Material with Disorder (^)
S. Gupta, R. Moini, *Advanced Materials* (IF - 26.8), August 2024.
DOI - https://doi.org/10.1002/adma.202313904
Featured in *Advanced Materials* Back Cover
Press release link here

10. Tough Double-Bouligand Architected Cementitious Material using Robotic Additive Manufacturing (^)
A. Prihar, **S. Gupta**, H. S. Esmaeeli, R. Moini, *Nature Communications* (IF - 15.7), August 2024.
DOI - https://doi.org/10.1038/s41467-024-51640-y
Press release link here

9. Tough and Ductile Nacre-like Cementitious Composites (^)
S. Gupta, H. S. Esmaeeli, R. Moini, *Advanced Functional Materials* (IF - 19), April 2024.
DOI - https://doi.org/10.1002/adfm.202313516
Featured in *Advanced Functional Materials* Back Cover
Press release link here

8. 3D-Printing of Architected Calcium Silicate Binders with Enhanced Carbonation (^)
N. Ralston, **S. Gupta**, R. Moini, *Virtual and Physical Prototyping* (IF - 10.2), May 2024.
DOI - https://doi.org/10.1080/17452759.2024.2350768

7. Fracture and Transport Analysis of Heterogeneous 3D-Printed Lamellar Cementitious Materials (^)
S. Gupta, H. S. Esmaeeli, A. Prihar, R. M. Ghantous, W. J. Weiss, R. Moini, *Cement and Concrete Composites* (IF - 13.1), July 2023.
DOI - https://doi.org/10.1016/j.cemconcomp.2023.105034
Press release link here

6. Examining Effect of Printing Directionality on the Freezing-and-Thawing Response of Three-Dimensional-Printed Cement Paste (^)
R. M. Ghantous, A. Evseeva, B. Dickey, **S. Gupta**, A. Prihar, H. S. Esmaeeli, R. Moini, W. J. Weiss, *ACI Materials* (IF - 1.9), July 2023.
DOI - http://doi.org/10.14359/51738808

5. Continuous Wave Laser Grooving of Cementitious Materials (^)
M. Rupp, S. Hayashi, C. Dashe, **S. Gupta**, R. Moini, C. B. Arnold, *Applied Physics A* (IF - 2.8), 2023.

DOI - http://doi.org/10.1007/s00339-023-06414-6

4. Meta-Analysis and Machine Learning Models to Optimize the Efficiency of Self-Healing Capacity of Cementitious Material
S. Gupta, S. Al-Obaidi, and L. Ferrara, *Materials* (IF - 3.2), 2021.
DOI - https://doi.org/10.3390/ma14164437
Featured as Editor's choice

3. State of the Art on Self-healing Capacity of Cementitious Materials Based on Data Mining Strategies
S. Gupta, S. Al-Obaidi, and L. Ferrara, *ACI Special Publication*, 2021.
DOI - http://doi.org/10.14359/51734310

2. High-temperature Performance of Ambient-cured Alkali-Activated Binder Concrete
K. K. Ramagiri, D. R. Chauhan, **S. Gupta**, A. Kar, D. Adak, and A. Mukherjee, *Innovative Infrastructure Solutions* (IF - 2.4), 2021.
DOI - http://doi.org/10.1007/s41062-020-00448-y

1. Performance of Alkali Activated Binder Treated Jute Geotextile as Reinforcement for Subgrade Stabilisation
S. Gupta, A. Guharay, A. Kar, V.P. Komaravolu, *International Journal of Geotechnical Engineering* (IF - 2.3), 2018.
DOI - https://doi.org/10.1080/19386362.2018.1464272

Peer-Reviewed Conference Papers

(^) indicates work conducted at Princeton University.

5. Geometric Fidelity Study in Two-Component Robotic Additive Manufacturing of Interlocking Bodies (^)
D. Daneshvar, M. Rabiei, **S. Gupta**, A. Prihar, A. Najmeddine, R. Moini, *4th RILEM International Conference on Concrete and Digital Fabrication*, September 2024.
DOI - https://doi.org/10.1007/978-3-031-70031-6_16

4. Data mining strategies to handle state of art knowledge on Self-healing capacity of cementitious materials
S. Gupta, S. Al-Obaidi, and L. Ferrara, *75th RILEM Week Merida 2021*, Mexico, August 2021.
DOI - https://doi.org/10.1007/978-3-031-21735-7_20

3. Predicting Durability Characteristics of Concrete with Alkali Activated Binders using Reliability Analysis
K. K. Ramagiri, D. R. Chauhan, **S. Gupta**, R. Sridharan, A. Kar, A. Unnikrishnan, A. Guharay, *Earth & Space 2021: Engineering for Extreme Environments*, ASCE, Seattle, April 2021.
DOI - https://doi.org/10.1061/9780784483381.011

2. Evaluation of Structural Performance of Concrete with Ambient-cured Alkali Activated Binders
K. K. Ramagiri, D. R. Chauhan, **S. Gupta**, A. Kar, D. Adak, and A. Mukherjee, *Lecture Notes in Civil Engineering*, Vol 46. Springer, 2019.
DOI - https://doi.org/10.1007/978-3-030-26365-2_1

1. Effect of Strain Rate on Interface Friction Angle Between Sand and Alkali Activated Binder Treated Jute
S. Gupta, A. Guharay, A. Kar, V.P. Komaravolu, *Proceedings of China-Europe Conference on Geotechnical*

Engineering. Springer Series in Geomechanics and Geoengineering. Springer, 2018.
DOI - https://doi.org/10.1007/978-3-319-97112-4_179

Manuscripts Under Review

(^) indicates work conducted at Princeton University.

2. Tough, Strong, and Ductile Cementitious Interlocking Suture Interfaces by Engineering Hard-Soft Composition (Under Review) (^)
D. Daneshvar, A. Najmeddine, **S. Gupta**, R. Moini

1. A Review of Software and Computational Tools in Additive Construction: Design, Slicing, Control, and Numerical Simulation (Under Review) (^)
R. Moini, S. L. Platt, A. Najmeddine, **S. Gupta**, C. Ouellet-Plamondon

Book Chapters

(^) indicates work conducted at Princeton University.

2. Fracture Mechanics of Layered and Additively Manufactured Materials: Theoretical Frameworks and Experimental Approaches, 3D Printing of Concrete: Properties, Materials, and Modelling, *3D Printing of Concrete*, Taylor and Francis (Under Production) (^)
S. Gupta, A. Najmeddine, R. Moini

1. Computational Fracture Mechanics of Layered and Additively Manufactured Materials: Numerical Approaches and Constitutive Modeling, 3D Printing of Concrete: Properties, Materials, and Modelling, *3D Printing of Concrete*, Taylor and Francis (Under Production) (^)
A. Najmeddine, **S. Gupta**, R. Moini

Invited Presentations

(^) indicates work conducted at Princeton University.

7. "Microstructure, Pore Connectivity, and Fracture Properties of 3D-Printed Cementitious Materials", CEE 523 (Concrete Fundamentals), *School of Civil and Construction Engineering*, Oregon State University, December 2025. (^)

6. "A Phase-field Approach to Brittle Fracture in Tubular Architected Cementitious Materials Inspired by Cortical Bone", *Civil and Environmental Engineering (CEE) Seminar*, Princeton University, October 2025. (^)

5. "From Tiny to All, Printing it All", *School of Civil and Construction Engineering*, Oregon State University, May 2025. (^)

4. "Toughness and Disorder in Cortical-Bone Inspired Tubular Architected Cementitious Materials", *Civil and Environmental Engineering (CEE) Seminar*, Princeton University, February 2025. (^)

3. "Leveraging Imaging Techniques to Understand Microstructural Heterogeneities in 3D-Printed Cementitious Binders", *Nature Conference on 3rd Frontiers in Electron Microscopy for Physical and Life Sciences*, Princeton University, October 2024. (^)

2. "Tough Cortical-Bone Inspired Tubular Architected Cement-based Material", *RILEM Youth Council Webinar*, RILEM Association, February 2024. (^)

1. "Image Analysis Techniques for Understanding Microstructural Heterogeneities: Case of 3D printed Cementitious and CS-binders", *Materials Imaging Workshop*, Princeton University, October 2023. (^)

Conference Presentations

'#' denotes the presenter. (^) indicates work conducted at Princeton University.

21. **S. Gupta**#, A. Najmeddine, R. Moini, "A Phase-field Approach to Brittle Fracture in Tubular Architected Cementitious Materials Inspired by Cortical Bone", *18th U.S. National Congress on Computational Mechanics*, Chicago, July 2025. (^)

20. R. Moini#, **S. Gupta**, "A Statistical Mechanics Approach to Quantifying Disorder of Arrangements and Purposeful Design of Materials", *18th U.S. National Congress on Computational Mechanics*, Chicago, July 2025. (^)

19. **S. Gupta**#, H. S. Esmaeeli, R. Moini, "Fracture Mechanics of Tough and Ductile Nacre-like Cementitious Composites", *ACerS Cements 2025*, CU Boulder, Boulder, Colorado, June 2025. (^)

18. R. Moini#, **S. Gupta**, "Disorder in Tough Cortical-Bone Inspired Design of Cement-based Materials", *ACerS Cements 2025*, CU Boulder, Boulder, Colorado, June 2025. (^)

17. **S. Gupta**#, H. S. Esmaeeli, R. Moini, "Fracture Mechanics of Tough and Ductile Nacre-like Cementitious Composites", *ACI Concrete Convention*, Philadelphia, November 2024. (^)

16. **S. Gupta**#, M. P. Adams, A. Strand, Y. Zhang, W. Huang, M. J. Bandelt, H. Wang, R. Moini, "Low-Embodied Carbon Concrete Enabled by Aggregate and Concrete Optimization", *ACI Concrete Convention*, Philadelphia, November 2024. (^)

15. D. Daneshvar, M. Rabiei, **S. Gupta**, A. Najmeddine, A. Prihar, R. Moini#, "Geometric Fidelity of Interlocking Bodies in Two-Component Robotic Additive Manufacturing", *RILEM Digital Concrete 2024*, Munich, September 2024. (^)

14. **S. Gupta**#, R. Moini, "Cortical Bone-inspired Tough Tubular Architected Cementitious Materials – Understanding Disorder", *Engineering Mechanics Institute 2024 Conference*, Chicago, May 2024. (^)

13. R. Moini#, **S. Gupta**, H. S. Esmaeeli, D. Daneshvar,"Engineering Mechanics Nacre-like Cementitious Composites", *Engineering Mechanics Institute 2024 Conference*, Chicago, May 2024.(^)

12. **S. Gupta**#, A. Najmeddine, R. Moini, "Mechanics of Tough Cortical Bone-Inspired Architected Cementitious Material", *2023 SES Annual Technical Meeting*, University of Minnesota, October 2023. (^)

11. A. Najmeddine#, **S. Gupta**, R. Moini, "Phase-field Cohesive Zone Crack Propagation Model for Hard-Soft Architected Materials", *2023 SES Annual Technical Meeting*, University of Minnesota, October 2023. (^)

10. **S. Gupta**#, A. Najmeddine, R. Moini, "Cortical Bone-Inspired Tough Architected Cement-Based Materials", *17th U. S. National Congress on Computational Mechanics*, Albuquerque, July 2023. (^)

9. **S. Gupta**#, R. Moini, "Design, Manufacturing, And Fracture Mechanics of Bone-Inspired Tough Architected Cement-Based Materials", *ACerS Cements 2023*, Columbia University, New York City, June 2023. (^)

8. **S. Gupta**#, R. Moini, "Mechanics of Tough Cortical Bone-Inspired 3D-Printed Architect Cement-Based Materials", *ACI Concrete Convention*, San Francisco, April 2023. (Link) (^)

7. **S. Gupta**[#], H. S. Esmaeeli, A. Prihar, R. M. Ghantous, W. J. Weiss, R. Moini, "Microstructural Heterogeneity, Fracture, and Transport in Layered 3D-Printed Cementitious Materials", San Francisco, *ACI Concrete Convention*, April 2023. (Link) (^)

6. A. Prihar[#], **S. Gupta**, H. S. Esmaeeli, R. Moini, "Tough Bouligand and Double-Bouligand Architected Concrete Enabled by Two-Component Robotic Additive", San Francisco, *ACI Concrete Convention*, April 2023. (Link) (^)

5. **S. Gupta**, S. Al-Obaidi[#], and L. Ferrara, "Data Mining Strategies to Handle State of Art Knowledge on Self-healing Capacity of Cementitious Materials", *75th RILEM Annual Week*, August 2021. (Link)

4. **S. Gupta**, S. Al-Obaidi, and L. Ferrara[#], "Self-healing Capacity of Cementitious Materials Based on Data Mining Strategies", *ACI Virtual Concrete Convention*, March 2021. (Link)

3. K. K. Ramagiri[#], **S. Gupta**, D. R. Chauhan, A. Kar, and D. Adak, "Evaluation of the Behavior of Reinforced Concrete with Alkali Activated Binders under Ambient Curing Conditions", *Structural Engineering Convention 2018*, Kolkata, India, December 2018.

2. D.R. Chauhan[#], K.R. Kiran, **S. Gupta**, A. Kar, "Evaluation of the behavior of reinforced concrete with alkali activated binders exposed to severely high temperatures.", *The International Federation for Structural Concrete 5th International Congress 2018, Melbourne*, Australia, October 2018.

1. **S. Gupta**[#], A. Guharay, A. Kar, "Effect of Alkali Activated Binder treated Jute Reinforcement on permeability of cohesionless soil.", *6th Indian Young Geotechnical Engineers Conference 2017*, NIT Trichy, India March, 2017. (Link)

Posters

(^) indicates work conducted at Princeton University.

11. **S.Gupta**[#], A. Prihar, H.S. Esmaeeli, R. Moini, "Robotic Fabrication of Bio-Inspired Tough Architected Cementitious Materials (ACM)", *Princeton Robotic Inaugural Symposium*, Princeton, April 2026. (^)

10. **S.Gupta**[#], R. Moini, "Bioinspiration for Engineering Tough and Ductile Architected Cementitious Materials", *C3 Symposium*, Chicago, October 2025. (^)

9. **S.Gupta**[#], H. S. Esmaeeli, A. Prihar, R. M. Ghantous, W. J. Weiss, R. Moini, "Leveraging Imaging Techniques to Understand Microstructural Heterogeneities in 3D-Printed Cementitious Binders", *Nature Conference on 3rd Frontiers in Electron Microscopy for Physical and Life Sciences*, Princeton University, October 2024. (^)

8. **S Gupta**[#] and R. Moini, "Tough Cortical-Bone Inspired Tubular Architected Cement-Based Material", Princeton E-ffiliates Partnership Retreat 2024, Princeton University, June 2024. (Link) (^)

7. **S Gupta**[#] and R. Moini, "Tough Cortical-Bone Inspired Tubular Architected Cement-Based Material", Princeton Center of Theoretical Science (PCTS) workshop, Princeton University, April 2024. (^)

6. **S Gupta**[#] and R. Moini, "Tough Cortical-Bone Inspired Tubular Architected Cement-Based Material", Princeton Advanced Manufacturing Symposium, Princeton University, April 2024. (^)

5. **S Gupta**[#], H. S. Esmaeeli, A. Prihar, R. M. Ghantous, W. J. Weiss, R. Moini, "Microstructural Heterogeneity, Fracture, and Transport in Layered 3D-Printed Cementitious Materials", 2023 SES Annual Technical Meeting, University of Minnesota, October 2023. (^)

4. **S Gupta**[#], H. S. Esmaeeli, A. Prihar, R. M. Ghantous, W. J. Weiss, R. Moini, "Microstructural Heterogeneity, Fracture, and Transport in Layered 3D-Printed Cementitious Materials" – American Concrete Institute Convention, San Francisco, 2023. (^)

3. **S. Gupta**[#], H. S. Esmaeeli, A. Prihar, W. Makinen, N. Ralston, K. Delnoce, and R. Moini, "Bio-inspired Design and Additive Manufacturing of Architected Cement-based Materials", Princeton Institute of Material (PMI) Symposium, Princeton, 2022. (^)

2. **S. Gupta**[#], C. Brown, H. S. Esmaeeli, A. Prihar, W. Makinen, E. C. Davidson, and R. Moini, "Dual-intent Polymer Additives for 3D-printing of Cementitious Materials", Princeton Center for Complex Materials (PCCM) Symposium, Princeton, 2022. (^)

1. **S. Gupta**[#], A. Guharay, A. Kar, V.P. Komaravolu, "Alkali Activated Binder treated Jute Reinforced Soil: A Preliminary Study.", Indian Geotechnical Conference, IIT Guwahati, India, December 2017.

Reports

(^) indicates work conducted at Princeton University.

2. **S. Gupta**, R. Moini. 2023. "Low-Carbon Concrete Pilot Program (No. Cait-UTC-REG60)." *Center for Advanced Infrastructure and Transportation (CAIT)(UTC)*. (Link) (^)

1. M. P. Adams, M. J. Bandelt, M. A. Abed, H. Wang, W. Huang, R. Moini, **S. Gupta**. 2021. "Low Carbon Concrete Pilot Program: Task B Report–Proposed Low Embodied Carbon Concrete Mixtures for Further Testing and Analysis." *Port Authority of New York and New Jersey*. (Link) (^)

Patents

(^) indicates work conducted at Princeton University.

3. L. Tomholt, **S. Gupta**, F. Meggers, R. Gupta, "Laser engraved capillary channels in ceramic materials for fluid propagation and surface wetting", US Patent Application No. 63741664. (Provisional) (^)

2. N. Ralston, R. Moini, W. Makinen, **S. Gupta**, "In-line carbonation and 3D-printing of calcium silicate-based cement paste with cellular architecture", US Patent Application No. 63461483. (Provisional) (^)

1. A. Guharay, A. Kar, **S. Gupta** "Treatment process for cellulose-based geotextile and geotextile obtained therefrom", Indian Patent Application No. 201711033016, Published: 22, March, 2019. (Link) (Listed in "*Top 100 Indian Innovations of 2023*" by Indian Innovators Association (Link))

Technical Skills

Computational:

- Programming Languages (e.g., MATLAB, Python, G-code, FORTRAN)
- Computer-aided Design Software (e.g., Rhino/Grasshopper, AutoCAD, Fusion 360)
- Robotic Programming Software and Language (e.g., RobotStudio, RAPID)
- Design and Simulation Software (e.g., Abaqus, ETABS)

Experimental:

- Extrusion-based Additive Manufacturing of Polymer and Cementitious Materials (e.g., Ultimaker 2+, Ultimaker S5, 3D-Potter, Multi-material 3D Printer)
- Industrial Robotic Programming (e.g., ABB)
- Mechanical Testing (e.g., Universal Testing Machine, Digital Image Correlation, Rheometers, Triaxial Test Equipment, Model Plate load, Large Shear Box)
- Imaging and Microscopy (e.g., Scanning Electron Microscopy (SEM and EDX), Micro Computed Tomography (Micro-CT), Atomic Force Microscopy, Stereo-microscopy, Optical Microscopy)
- Microstructural Characterization (e.g., X-ray diffraction, Thermo-gravimetric analysis)

Mentorship

Mentored the following undergraduate and graduate students at Princeton University:

- Maxwell Seidel (Undergraduate 2024-25)
- Zayvinn Lin (Undergraduate 2024-25)
- Benjamine Gorse (Undergraduate 2023-24)
- Katherine Shirk (Undergraduate 2023-24)
- Daria Fontani Herreros (Undergraduate 2023-24)
- Manus McCracken (Undergraduate, 2023-24)
- Masha Mustafa (Undergraduate Summer 2023)
- Justin Chae (Undergraduate Summer 2023)
- Krystal Delnoce (Graduate, 2022-23)
- Ken Lim (Undergraduate 2022-23)
- Hannah Hutton (Undergraduate Fall 2022)
- William Makinen (Undergraduate, 2021-22)
- Nadia Ralston (Undergraduate, 2021-22)

Teaching

CEE 374 - Autonomous Fabrication and Robotics, Princeton University (Volunteer) *Fall 2025*

- Assisted in developing new course materials, including lecture slides, homework problems, and laboratory modules.
- Assisted in designing and developing lab instructions to guide students through hands-on experiments.
- Supported active learning by assisting students directly in laboratory sessions.

CE F320 - Design of Reinforced Concrete Structures, BITS Pilani *Fall 2020*

- Collaborated with instructors to create engaging and challenging assignments problems.
- Contributed to grading exams and assignments, providing detailed feedback to support student growth and academic excellence.

CE F313 - Foundation Engineering, BITS Pilani *Fall 2017*

- Provided hands-on assistance to students with their course projects by demonstrating the operation of laboratory equipment, including the large shear box, model plate load, and universal testing machine (UTM).

- Instructed students in the foundational concepts and practical application of Plaxis 2D, enabling them to perform geotechnical analyses and simulations effectively.

Professional Activities

- American Concrete Institute (ACI)
  - ACI 564: 3D-printing with Cementitious Materials - *Associate Member*
  - ACI 236: Material Science of Concrete - *Associate Member*
- RILEM - *Young Member*

Reviewer Service to Scientific Journals

Served as a peer reviewer for the following journals:

- Nature Communications
- Journal of Applied Mechanics
- Additive Manufacturing
- Nature Scientific Reports
- American Chemical Society (ACS) Sustainable Chemistry & Engineering
- Korean Society of Civil Engineers (KSCE) Journal of Civil Engineering

Volunteer Activities

Judge at 3rd Annual New Jersey High School Ethics Bowl *February 2026*

Coffee Hour Organizer: CEE, Princeton University *September 2024 – May 2025*

- Organize weekly coffee hour for the CEE graduate students, staff, and faculty to enjoy coffee, tea, and snacks

Technical Head: Nonurbanism, A Student Movement *August 2020 – July 2021*

- Led a team of engineers to delineate ideas and develop engineering-based solutions to promote the self-organizing and governing heritage and potential of communities living in rural areas of the world.

Student Representative: Department of Civil Engineering, BITS Pilani *August 2016 – July 2017*

- Represented undergraduate students, communicated collective feedback to faculty, and facilitated dialogue to improve academic and administrative processes.

Academic Outreach & Engagement

Presentation in "Take Your Child to Work Day", SEAS, Princeton *June 2025*

Prepared demonstrations in "Science Day" for K–12 Students, PCCM *November 2022*

Lab Tour for "K–12 Outreach Program", The Watershed Institute *August 2022*

Selected Media Coverage

- Featured article on bone-architected material - Architecture lab (May 2025) (Press link to article)
- Interview on bone-inspired tubular architected cement-based material - Fast Company (October 2024) (Press link to article)

- Interview on crack-resistant concrete - Engineeringness (September 2024) (Press link to article)
- Featured article on bone-inspired tougher cement-based material - The Engineer (September 2024) (Press link to article)

Languages

English – Fluent; Hindi – Mother tongue; Punjabi – Fluent