UNIVERSITY OF CAMBRIDGE

Soheila Kookalani

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Department of Civil Engineering, University of Cambridge, Cambridge, CB3 0FA, United Kingdom

PROFESSIONAL SUMMARY:

Innovative Research Associate with extensive experience in Civil and Structural Engineering, specializing in steel reuse, circular economy, life-cycle assessment, and digital twin technology. Proven track record of integrating artificial intelligence and machine learning to optimize structural design. Published author with a strong commitment to sustainability in construction.

🎓 EDUCATION & PROFESSIONAL EXPERIENCE

Research Associate Civil and Structural Engineering 2023-Date

University of Cambridge, Cambridge, UK

Project: "Reuse of structural steel in Construction"

Focus Areas: Steel reuse, Circular economy, Life-cycle assessment, Building information modelling, Digital twin, Generative AI, Sustainable structural design

Ph.D. Civil and Structural Engineering 2018-2022

Shanghai Jiao Tong University, Shanghai, China

Thesis: "Research on structural design and optimization of lifting self-forming GFRP elastic gridshells based on machine learning"

M.Sc. Civil and Structural Engineering 2016-2018

Hohai University, Nanjing, China

Thesis: "Seismic performance of steel-concrete hybrid structure high-rise building with dampers"

B.Sc. Architectural Engineering 2008-2012

Azad University, Najafabad, Iran

Thesis: "Art and technology park of progressive cinematic arts based on hybrid architecture"

PUBLICATIONS

1. **S. Kookalani**, E. Parn, I. Brilakis, S. Dirar, M. Theofanous, A. Faramarzi, M. Mahdavipour, Q. Feng, "Trajectory of Building and Structural Design Automation from Generative Design Towards the Integration of Deep Generative Models and Optimization: A Review", *Building Engineering*, vol. 97, 2024, doi: 10.1016/j.jobe.2024.110972.
2. **S. Kookalani**, B. Cheng, S. Xiang, "Shape Optimization of GFRP Elastic Gridshells by the Weighted Lagrange E-Twin Support Vector Machine and Multi-Objective Particle Swarm Optimization Algorithm Considering Structural Weight", *Structures*, vol. 33, pp. 2066–2084, 2021, doi:10.1016/j.istruc.2021.05.077.
3. **S. Kookalani**, B. Cheng, J. L. Chavez Torres, "Structural Performance Assessment of GFRP Elastic Gridshells by Machine Learning Interpretability Methods", *Frontiers of structural and civil engineering*, vol. 16, pp. 1249-1266, 2022, doi.org/10.1007/s11709-022-0858-5.
4. **S. Kookalani**, S. Nyunn, S. Xiang, "Form-Finding of Lifting Self-Forming GFRP Elastic Gridshells Based on Machine Learning Interpretability Methods", *Structural engineering and mechanics*, vol. 84, no. 5, pp. 605-618, 2022, doi.org/10.12989/sem.2022.84.5.605.
5. **S. Kookalani**, D. Shen, L. Zhu, M. Lindsey, "An Overview of Optimal Damper Placement Methods in Structures", *Iranian journal of science and technology-transactions of civil engineering*, vol. 46, pp. 1785-1804, 2021, doi.org/10.1007/s40996-021-00752-2.
6. S. Xiang, B. Cheng, **S. Kookalani**, "An Analytic Solution for Form Finding of GFRP Elastic Gridshells during Lifting Construction", *Composite Structures*, vol. 244, 2020, doi: 10.1016/j.compstruct.2020.112290.
7. S. Xiang, B. Cheng, **S. Kookalani**, J. Zhao, "An Analytic Approach to Predict the Shape and Internal Forces of Barrel Vault Elastic Gridshells during Lifting Construction", *Structures*, vol. 29, pp. 628-637, 2021, doi: 10.1016/j.istruc.2020.11.032.
8. S. Xiang, B. Cheng, L. Zou, **S. Kookalani**, "An Integrated Approach of Form Finding and Construction Simulation for Glass Fiber-Reinforced Polymer Elastic Gridshells", *Structural Design of Tall and Special Builings.*, vol. 29, no. 5, 2020, doi: 10.1002/tal.1698.
9. H. Alavi, **S. Kookalani**, F. Rahimian, N. Forcada, "Introduction of Methodology for BIM & DSS", *Integrated Building Intelligence*, 2024, 31-42, doi: 10.1007/978-3-031-68865-2_3.
10. H. Alavi, **S. Kookalani**, F. Rahimian, N. Forcada, "BIM-Based DSS for HVAC Root-Cause Detection", *Integrated Building Intelligence*, 2024, 43-57, doi: 10.1007/978-3-031-68865-2_4.
11. H. Alavi, **S. Kookalani**, F. Rahimian, N. Forcada, "BIM-Based DSS for Building Condition Assessment", Integrated Building Intelligence, 2024, 59-78, doi: 10.1007/978-3-031-68865-2_5.
12. H. Alavi, **S. Kookalani**, F. Rahimian, N. Forcada, "BIM-Based DSS for Enhancing Occupants' Comfort", Integrated Building Intelligence, 2024, 79-99, doi: 10.1007/978-3-031-68865-2_6.
13. H. Alavi, **S. Kookalani**, F. Rahimian, N. Forcada, "BIM-Based Augmented Reality for Facility Maintenance Management", Integrated Building Intelligence, 2024, 101-112, doi: 10.1007/978-3-031-68865-2_7.
14. **S. Kookalani**, Htay Htayaung, "GFRP Elastic Gridshell Structures: A Review of Methods, Research, Applications, Opportunities, and Challenges", *Journal of civil engineering and materials application*, 2023, doi: 10.22034/JCEMA.2023.401834.1111.
15. **S. Kookalani**, B. Cheng, "Structural Analysis of GFRP Elastic Gridshell Structures by Particle Swarm Optimization and Least Square Support Vector Machine Algorithms", *Journal of civil engineering and materials application*, 2021, doi: 10.22034/JCEMA.2021.304981.1064.
16. **S. Kookalani**, D. Shen, "Effect of Fluid Viscous Damper Parameters on the Seismic Performance", *Journal of civil engineering and materials application*, vol. 4, no. 3, 2020, doi: 10.22034/jcema.2020.232288.1025.

17. **S. Kookalani**, O. Gozde Basak, H. Alavi, E. Parn, I. Brilakis, "Interpretable Machine Learning for Predicting the Fatigue Strength of Steel: Influence of Composition and Processing Parameters", *42nd International Symposium on Automation and Robotics in Construction*, Montreal, Canada, July 28-31, 2025, doi: 10.22260/ISARC2025/0136.
18. H. Alavi, P. Luo, **S. Kookalani**, Y. Wen, W. Chen, I. Brilakis, "Intelligent BIM-Integrated Decision Support for Life Cycle Assessment Using Large Language Models", *International Conference on Digital Frontiers in Buildings and Infrastructure* (*DFBI 2025*), Delft University of Technology (TU Delft), Delft, Netherlands, June 11-13, 2025.
19. N. Pan, M. Sasidharan, S. Okazaki, M. Herrera, S. I. Cho, **S. Kookalani**, A. K. Parlikad, "Incorporating Asset Interdependency in Risk Assessment Modelling: A Bayesian Neural Network Approach", *The 1st International Workshop on Bayesian Approach in Civil Engineering* (*IWOBA 2025*), Hong Kong, China, January 10-12, 2025.
20. Q. Feng, M. A. Mahdavipour, M. Theofanous, S. Dirar, A. Faramarzi, **S. Kookalani**, E. Parn, I. Brilakis, "Flexural Behaviour of Corroded Steel I-Sections", *13th International Conference on Advances in Steel-Concrete Composite Structures* (*ASCCS 2024*), Hong Kong, China, December 11-13, 2024.
21. **S. Kookalani**, E. Parn, I. Brilakis, R. Li, Z. Hu, "Correlating Interfacial Shear Strength and Material Properties in Fiber Reinforced Composites", *The 20th conference of the International Society for Computing in Civil and Building Engineering*, Montreal, Canada, 25-28 August, 2024.
22. **S. Kookalani**, E. Parn, I. Brilakis, P. Luo, H. Alavi, M. Wang, S. Green, "Matching Reused Elements to Structural Designs for Steel Reuse", *ASCE International Conference on Computing in Civil Engineering*, Pittsburgh, Pennsylvania, USA, 28-31 July, 2024.
23. R. Li, Z. Hu, **S. Kookalani**, H. Chi, "TCLP-Judge: A Deep Learning Model for Real-Time Evaluation of Tower Crane Layout Planning Considering Construction Safety and Efficiency", *ASCE International Conference on Computing in Civil Engineering*, Pittsburgh, Pennsylvania, USA, 28-31 July, 2024.
24. M. Wang, W. Ya, P. Yuandong, W. Guangming, H. Alavi, **S. Kookalani**, I. Brilakis, "Automated Generation of Geometric Digital Twin of Roof for Building Retrofitting", *ASCE International Conference on Computing in Civil Engineering*, Pittsburgh, Pennsylvania, USA, 28-31 July, 2024.
25. P. Luo, E. Parn, **S. Kookalani**, I. Brilakis, "TailorAlert: Large Language Model-Based Personalized Alert Generation System for Road Infrastructure Management with Digital Twins", *ASCE International Conference on Computing in Civil Engineering*, Pittsburgh, Pennsylvania, USA, 28-31 July, 2024.
26. H. Alavi, M. Wang, G. Wang, **S. Kookalani**, A. Mathew, I. Brilakis., "Digital Twins in Construction: Leveraging Point Cloud Data and BIM for Monitoring Project Schedule", *ASCE International Conference on Computing in Civil Engineering*, Pittsburgh, Pennsylvania, USA, 28-31 July, 2024.
27. **S. Kookalani**, E. Parn, I. Brilakis, N. Pan, M. Wang, H. Alavi, "Exploring Deep Generative Models in Building Design", *European conference on computing in construction*, Chania, Crete, Greece, 14-17 July, 2024.
28. M. Wang, Y. Wen, Y. Pan, H. Alavi, **S. Kookalani**, W. Chen, I. Brilakis, "Automatic Extraction of Building Features for Building Facades Based on Laser Scanning Technology", *European conference on computing in construction*, Chania, Crete, Greece, 14-17 July, 2024.
29. H. Alavi, W. Chen, M. Wang, **S. Kookalani**, I. Brilakis, "Enhancing Building Maintenance Efficiency Through Bim-Lidar Integration", *European conference on computing in construction*, Chania, Crete, Greece, 14-17 July, 2024.
30. **S. Kookalani**, E. Parn, I. Brilakis, "Assessment of the Bearing Capacity of Double Shear-Bolted Connections in Structural Steel", *31st EG-ICE International Workshop on Intelligent Computing in Engineering*, Vigo, Spain, 3-5 July, 2024.
31. **S. Kookalani**, I. Brilakis, O. Gozde Basak, "Machine Learning-Driven Structural Analysis of Lifting Self-Forming GFRP Elastic Gridshells", *8th International Project and Construction Management Conference* (*IPCMC2024*), Istanbul, Turkey, 6-8 June, 2024.

32. O. Gozde Basak, I. Brilakis, **S. Kookalani**, "Generative AI Research Fields in the AEC-FM Industry", *8th International Project and Construction Management Conference* (*IPCMC2024*), Istanbul, Turkey, 6-8 June, 2024.
33. **S. Kookalani**, E. Parn, I. Brilakis, "Interpretable Machine Learning Approaches for Assessing Maximum Force in Fiber-Reinforced Composites", *The International Association for Automation and Robotics in Construction*, Lille, France, 3-5 June, 2024.
34. **S. Kookalani**, E. Parn, I. Brilakis, S. Dirar, M. Theofanous, A. Faramarzi, M. Mahdavipour, Q. Feng, "Innovative Approach to Sustainable Reuse of Structural Steel in Construction based on Generative Digital Twin Design Tool", *Laing O'Rouke Centre, Information Technology Showcase*, Cambridge, UK, May 10, 2024.
35. E. Parn, **S. Kookalani**, I. Brilakis, S. Dirar, M. Theofanous, M. Mahdavipour, Q. Feng, A. Faramarzi, "RESTOR: Reuse of Structural Steel in Construction", *Digital roads of the future, annual review*, Cambridge, UK, November 13, 2024.
36. **S. Kookalani**, E. Parn, I. Brilakis, S. Dirar, M. Theofanous, A. Faramarzi, M. Mahdavipour, Q. Feng, "Reinventing Steel with Artificial Intelligence: Towards a Sustainable Future in Construction", *Global Cleaner Production Conference*, Shanghai, China, November 9-12, 2023.
37. **S. Kookalani**, B. Cheng, "Structural Performance Prediction of GFRP Elastic Gridshell Structures by Artificial Neural Network", *6th international conference on applied researches in science and engineering*, Aachen, Germany, March 30, 2022.
38. **S. Kookalani**, B. Cheng, "Parametric-Insensitive Nonparallel Support Vector Regression for Structural Stress Prediction of GFRP Elastic Gridshell Structures", *International conference on new research and achievements in science, engineering and technologies*, Seoul, South Korea, December 12, 2021.
39. **S. Kookalani**, M. Lindsey, "Seismic Performance of Steel-Concrete Hybrid Structure for High-Rise Buildings with Viscous Dampers", *6th International conference on civil engineering, architecture, urban planning with sustainable development approach*, Iran, Shiraz, March 10, 2021.
40. **S. Kookalani**, S. Das, "A New Architectural Organization: Possibilities of Flexible Digital Spaces", *5th International conference on applied researches in science and engineering institution of engineering and technology of London*, Amsterdam, netherland, November 2, 2020.
41. **S. Kookalani**, D. Shen, "Seismic Performance of Structures with Viscous Dampers", *4th International conference on Civil, Architectural, environmental and urban management*, Prague, Czech, January, 2018.
42. **S. Kookalani**, H. Fotovvat, "New Spatial Structures in Architecture of Sets Associated with the Cinematic Arts", *International conference on new findings in civil engineering, architecture and urban development*, Tehran, Iran, September, 2015.
43. **S. Kookalani**, "The Formation of a New Form of Architecture and Creation of Hybrid Spaces", *International conference on new findings in civil engineering, architecture and urban development*, Tehran, Iran, September, 2015.
44. **S. Kookalani**, S. Dirar, S. J. Moghadam, M. A. Mahdavipour, Q. Feng, M. Theofanous, A. Faramarzi, E. Parn, I. Brilakis, "Deep Generative Models for the Design Automation of Green Buildings", *The Elgar Companion on Circularity, Deconstruction, and Adaptability in Green Buildings*, Book Chapter, 2025.
45. **S. Kookalani**, H. Li, T. Dash, A. Mathew, E. Parn, I. Brilakis, "Structural Integrity of Double Shear-Bolted Connections: A Bearing Capacity Evaluation", *Advanced Engineering Informatics Journal*, 2025, Under review.
46. L. Hongchen, S. Huaizhi, **S. Kookalani**, C. Mingsheng, L. Yumeng, W. Wenyuan, "Attention-Enhanced Spatiotemporal Deep Learning-based Automatic Warning Model with Uncertainty Estimation in Dam Safety", *Structural Health Monitoring*, 2025, Under review.
47. **S. Kookalani**, Q. Feng, C. Zhang, E. Parn, I. Brilakis, "Advancing Sustainable Construction Through Smart Design and Optimisation: Reinventing Steel With Artificial Intelligence", *Cleaner Production Journal*, 2025, Under process.

📘 BOOKS

- **S. Kookalani**, H. Alavi, F. Rahimian, "Structural Design and Optimization of Lifting Self-forming GFRP Elastic Gridshells based on Machine Learning", *Routledge*: *Taylor & Francis Group*, 2025, https://doi.org/10.1201/9781003565055.
- H. Alavi, **S. Kookalani**, F. Rahimian, N. Forcada, "Integrated Building Intelligence", *Springer*, 2024, https://doi.org/10.1007/978-3-031-68865-2.

👨‍🏫 TEACHING EXPERIENCE

- 1B Mechanics supervision, Newnham College, University of Cambridge, 2024 & 2025, Cambridge, UK.
- 3A1B Aerodynamics lab, University of Cambridge, 2024 & 2025, Cambridge, UK.
- 2CW_Presentation assessment, University of Cambridge, 2023, Cambridge, UK.
- A2 Model Structures, University of Cambridge, 2023, Cambridge, UK.
- LR3A Presentation & Marking, University of Cambridge, 2023, Cambridge, UK.
- Supervision, Rongyan Li, Visiting PhD student, 2023, University of Cambridge, Cambridge, UK.
- Supervision, Cong Zhang, Visiting lecturer, 2024, University of Cambridge, Cambridge, UK.
- Rhino software tutorial, 2016, Esfahan, Iran

🛠️ COURSE DEVELOPMENT

- Digital twin in construction, 2024, University of Cambridge, Cambridge, UK

🗣️ PRESENTATIONS

- Correlating Interfacial Shear Strength and Material Properties in Fiber Reinforced Composites, *20th conference of the International Society for Computing in Civil and Building Engineering*, Montreal, Canada, 25-28 August 2024.
- Exploring Deep Generative Models in Building Design, *European conference on computing in construction*, Chania, Crete, Greece, 14-17 July 2024.
- Assessment of the Bearing Capacity of Double Shear-Bolted Connections in Structural Steel, *31st EG-ICE International Workshop on Intelligent Computing in Engineering*, Vigo, Spain, 3-5 July 2024.
- Interpretable Machine Learning Approaches for Assessing Maximum Force in Fiber-Reinforced Composites, *The International Association for Automation and Robotics in Construction*, Lille, France, 3-5 June 2024.
- Reinventing Steel with Artificial Intelligence: Towards a Sustainable Future in Construction, *Global Cleaner Production Conference*, Shanghai, China, 9-12 November 2023.

🎤 INVITED TALKS

- "The impact of AI on the steel construction sector", 20 September 2023, British Constructional Steelwork Association, Sheffield, UK.
- "Generative Design", 9 June 2023, University of Cambridge, Cambridge, UK

📝 EDITORIAL REVIEW BOARD

- Smart and sustainable built environment journal

🔍 REVIEWER

- Reviewer for Automation in Construction, Engineering Structures, Construction engineering and management, Smart and sustainable built environment, Frontiers of architectural research, American Journal of Civil Engineering (AJCE), and publications by Routledge: Taylor & Francis.

🗓️ PROGRAMMS

- "An introduction to undergraduate supervision", 12 January 2024, University of Cambridge, Cambridge, UK.
- "EnterpriseTECH", 26 September 2023 – 6 February 2024, Cambridge Judge Business School, University of Cambridge, Cambridge, UK.

💰 RESEARCH GRANTS

- M-TABS (2024) Innovate UK Smart Grants, Grantor: Innovate UK, Title: Muon Tomography Assessing Bridge Structures, Grant Value: £1 Million, Collaborators: Prof. Ioannis Brilakis, 2024

🏆 HONORS AND AWARDS

- Digital Construction Award for the RESTOR project in the category of Delivering Sustainability with Digital Innovation, 2025, London, UK.
- Shanghai Jiao tong university scholarship for the PhD, 2018, Shanghai, China.
- Hohai university scholarship for the master's degree, 2016, Nanjing, China.