frontiers | Frontiers in Built Environment

TYPE Editorial
PUBLISHED 18 January 2024
DOI 10.3389/fbuil.2024.1303181

OPEN ACCESS

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RECEIVED 27 September 2023
ACCEPTED 11 January 2024
PUBLISHED 18 January 2024

CITATION
Azhar S, Castellazzi G, Işıkdağ Ü, Rungskunroch P and Vaiana N (2024), Editorial: Rising stars in built environment. *Front. Built Environ.* 10:1303181. doi: 10.3389/fbuil.2024.1303181

Editorial: Rising stars in built environment

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KEYWORDS

monitoring, waste, infrastructure, innovation, technology, automation

Editorial on the Research Topic
Rising stars in built environment

Introduction

Civil and structural engineering constantly adapts to challenges through technological innovation and novel methodologies. In this Research Topic, we focus on emerging researchers in the Built Environment, aiming to share insights and advancements across the community of young researchers shaping the future of our discipline.

This curated exploration unfolds across three key themes, each representing a cornerstone in the contemporary landscape of civil and structural engineering. These themes encompass the intricate interplay between technological innovation, research advancement, and practical application, collectively steering the evolution of the Built Environment.

Vibration-based health monitoring and automation technology

The first theme delves into the integration of Automation Technology and Structural Health Monitoring. Researchers explore practices to reduce material waste in construction sites through advanced automation technology. This involves applying automated systems to streamline construction processes, minimize inefficiencies, and promote sustainable practices. Simultaneously, the exploration of novel techniques for structural health monitoring represents the forefront of structural integrity assessment. Researchers are developing innovative solutions for real-time damage detection, load redistribution capacities, and advancements in monitoring technology to enhance the overall safety and efficiency of structures.

In the subsequent study by Satyadhrik Sharma, Michele Longo, and Francesco Messali, the focus shifts to the historical significance and structural challenges of masonry quay walls. Their research, titled “A novel tier-based numerical analysis procedure for the structural assessment of masonry quay walls under traffic loads,” presents a groundbreaking

method to evaluate these structures under dynamic conditions, demonstrating the evolving nature of structural assessment in the face of modern challenges, Sharma et al.

Moving forward, Federico Ponsi, Elisa Bassoli, and Loris Vincenzi bring a fresh perspective on structural damage detection in their paper, "Mitigation of model error effects in neural network-based structural damage detection." Their innovative approach underscores the crucial role of advanced computational methods in ensuring the accuracy and reliability of structural assessments, a testament to the intersection of machine learning and structural engineering, Ponsi et al.

In another insightful contribution, Domenico Camassa, Nicol`o Vaiana, and Anna Castellano explore the potential of ground-based radar interferometry in their mini-review, "Modal testing of masonry constructions by ground-based radar interferometry for structural health monitoring." This paper delves into the applicability of this novel technique in monitoring the health of masonry constructions, highlighting the continuous search for more effective and non-invasive monitoring strategies, Camassa et al.

Lastly, the Research Topic presents a study by Van Qui Lai and colleagues, titled "A machine learning regression approach for predicting the bearing capacity of a strip footing on rock mass under inclined and eccentric load." This research not only integrates machine learning into structural engineering but also addresses complex real-world problems, such as predicting the bearing capacity of strip footings under challenging conditions. The work of Lai et al. epitomizes the synergy between machine learning and traditional engineering approaches, paving the way for more predictive and resilient structural designs, Lai et al.

These articles collectively represent a significant stride in the field of vibration-based health monitoring and automation technology, each contributing unique insights and methodologies to advance our understanding and capabilities in structural health assessment and construction efficiency.

Novel techniques and model updating

Transitioning from the first theme, which emphasized the integration of automation technology and structural health monitoring, the second theme in this Research Topic takes a deeper dive into the realm of advanced modeling techniques. This section underscores the critical importance of refining our understanding of structural dynamics, focusing on innovative methods that push the boundaries of current knowledge and application in structural engineering.

Raffaele Capuano, Aguinaldo Fraddosio, and Mario Daniele Piccioni lead this thematic exploration with their comprehensive mini-review, "Phenomenological rate-independent uniaxial hysteretic models." This paper serves as a vital resource for structural engineers seeking to deepen their understanding of the dynamic behavior of structures under variable load conditions. Capuano et al. skillfully dissect these complex models, providing readers with a clear understanding of their application and significance in the field, Capuano et al.

Following this, Michele Tondi, Marco Bovo, and Loris Vincenzi present their groundbreaking work, "Efficient two-step procedure for parameter identification and uncertainty assessment in model updating problems." Their research addresses a crucial aspect of structural modeling - the identification of mechanical parameters and the assessment of corresponding uncertainties. The innovative two-step procedure introduced by Tondi et al. not only enhances the reliability of model updating processes but also significantly improves computational efficiency. This paper reflects the ongoing efforts in the field to optimize structural performance through refined modeling and simulation methodologies, Tondi et al.

Together, these articles form the core of the second theme, emphasizing the pivotal role of advanced modeling techniques in enhancing our understanding and capabilities in the realm of structural dynamics. They reflect a commitment to continuous improvement and innovation in the field, ensuring that structural engineering remains at the forefront of technological advancement and practical application.

Structural health assessment and material waste mitigation

The third theme explores Structural Health Assessment and Material Waste Mitigation. In this domain, researchers investigate the empirical relationship between the adoption of automation technology practices and their impact on construction site performance. The latest advancements include leveraging automation for enhanced construction site efficiency and material waste reduction measures. This theme not only addresses the practical challenges faced on construction sites but also highlights the role of technological interventions in enhancing overall construction efficiency and sustainability. Researchers aim to bridge the gap between theoretical advancements and on-site applications, shaping a more efficient and sustainable future for construction practices.

Building on the themes of advanced automation technology, novel modeling techniques, and structural health monitoring, this Research Topic invites readers to delve into the broader narrative of innovation and transformation in civil and structural engineering. Each paper in this section not only contributes to its specific domain but also to the ongoing evolution of the Built Environment, highlighting the convergence of technology, research, and practice in shaping a resilient and sustainable future.

Mahdi Mohammed Abdullah Abkar and colleagues present their empirical study, "An empirical investigation of automation technology as a material waste mitigation measure at Johor construction sites." This research explores the pivotal relationship between the adoption of automation technology and its impact on construction site performance, particularly focusing on material waste mitigation. The findings of Abkar et al. offer valuable insights into the practical applications and benefits of automation in construction, furthering the discourse on sustainable practices in the industry, Abkar et al.

Oluseye Olugboyega contributes an intriguing perspective on organizational transformation in "BIM leadership theory for organizational BIM transformation." This paper delves into the necessary leadership capacities for driving Building Information Modeling (BIM) transformation within construction organizations. Olugboyega addresses the unique leadership challenges posed by

BIM-driven changes, providing a comprehensive model for organizational adaptation and advancement in this field, Olugboyega.

Simone Galano's paper, "Vertical response of unbonded fiber reinforced elastomeric isolators (U-FREIs) under bidirectional shear loading," examines the performance of a specific type of seismic isolation device under complex loading conditions. By investigating the influence of geometric properties and loading conditions on the vertical response of these elastomeric bearings, Galano contributes significantly to our understanding of seismic mitigation technologies, an essential aspect of modern structural engineering, Galano.

Together, these articles enrich the overarching themes of the Research Topic, embodying the spirit of innovation and collaboration that drives the field of civil and structural engineering. They exemplify how research and practice intertwine to forge a more resilient and sustainable future for the Built Environment.

Conclusion

In wrapping up this Research Topic, it becomes apparent that the papers presented not only showcase the diversity and dynamism inherent in civil and structural engineering but also offer profound insights with far-reaching implications for the industry. The collaboration between seasoned researchers and emerging talents reflects a shared commitment to advancing knowledge, fostering innovation, and translating theoretical advancements into tangible applications.

The fusion of cutting-edge technological approaches, such as automation, with sophisticated modeling and monitoring techniques signals a transformative shift in the industry. A prevailing theme that resonates across these papers is the imperative to embrace technological advancements to tackle intricate challenges. From streamlining construction practices to employing neural networks for robust structural damage detection, the papers in this Research Topic underscore a forward-looking mindset crucial for the continual evolution of our field.

Furthermore, these papers collectively stress the interplay between various domains within civil and structural engineering. The interdisciplinary nature of Research Topic, spanning from vibration-based health monitoring to model updating and automation, underscores the need for a holistic approach in addressing contemporary challenges. The symbiotic relationship between these areas not only enhances our understanding of structural behavior but also cultivates integrated solutions that can revolutionize industry practices.

Navigating the ever-evolving landscape of the Built Environment, it becomes evident that the future of civil and structural engineering lies in collaborative efforts. Researchers, practitioners, and industry leaders converge to push the boundaries of what is possible. The insights gleaned from this Research Topic serve as a guiding compass, directing us towards a future where technological innovation, collaborative research, and practical application harmonize to shape a resilient, sustainable, and technologically advanced built world.

In conclusion, these papers not only contribute valuable knowledge to their respective domains but also invite contemplation on the broader implications and collective responsibility we bear in steering the course of civil and structural engineering. We eagerly anticipate the ripple effects these ideas will create as they permeate academia, industry, and practice, influencing the trajectory of our field for years to come.

Author contributions

SA: Writing–original draft. GC: Writing–original draft. ÜI: Writing–original draft. PR: Writing–original draft. NV: Writing–original draft.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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