Special Issue

From Materials to Management: Integrated Approaches for Long-Life Concrete Infrastructure

Message from the Guest Editors

This Special Issue highlights AI-enabled lifecycle management of concrete infrastructure, spanning intelligent inspection, monitoring, prediction, and decision support, while remaining grounded in materials' durability and structural performance. We welcome contributions on **computer-vision-based defect detection (cracks, spalling, or leakage), nondestructive testing enhanced by machine learning, multi-sensor data fusion, structural health monitoring analytics, and digital twins for condition assessment and predictive maintenance**. Papers integrating physics-based models with data-driven methods (e.g., physics-informed learning) for service-life prediction, chloride-induced corrosion risk assessment, and deterioration modelling are especially encouraged. We also invite research on **low-carbon cementitious materials, protective/repair systems, and microstructure–performance relationships**, particularly when linked to AI-supported evaluation or field deployment. Submissions should emphasize reproducible methods, uncertainty quantification, and practical implications for resilient maintenance and lifecycle decision-making.
https://www.mdpi.com/journal/buildings/special_issues/962N04IU6H

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About the Journal

Message from the Editor-in-Chief

Current urban environments are home to multi-modal transit systems, extensive energy grids, a building stock, and integrated services. Sprawling neighborhoods are composed of buildings that accommodate living and working quarters. However, it is expected that the cities and communities of the future will face complex and enormous challenges, including maintenance, interconnectivity, resilience, energy efficiency, and sustainability issues, to name but a few. A smart city uses advanced technologies and a digital infrastructure to improve the outcomes in every aspect of a city's operations. A smart building optimizes the experience of occupants, staff, and management by using a modern and connected environment. Innovations in technology that can bring dramatic improvements to design, planning, and policy are critical in developing the cities and buildings of the future.

Editor-in-Chief

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