

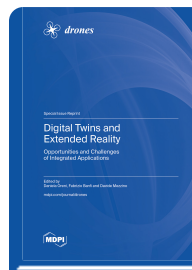
Special Issue Reprint

Digital Twins and Extended Reality: Opportunities and Challenges of Integrated Applications

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The architecture, engineering, and construction (AEC) industry, alongside the digital heritage sector, is increasingly benefiting from augmented reality (AR) and virtual reality (VR). These technologies, paired with advanced digital visualization, create interactive models of complex environments. Methods like scan-to-BIM, HBIM, and CoSim convert 3D survey data (point clouds) into detailed representations of architecture and heritage sites. Interoperability and data sharing are essential for creating the models used in conservation, design, and analysis. However, the current models often lack the interactivity and immersion needed for effective engagement. A context-sensitive approach is required to capture geometries, detail levels (LOD–LOA), and features based on the digital twin's (DT) intended purpose.

Integrating VR and AR with digital twin technologies can address these gaps, enhancing the management of 3D models for a range of users, from architects to virtual tourists. Drones, especially in hard-to-reach areas, enable the creation of accurate 2D and 3D models for preservation and restoration. Photogrammetry and LiDAR-generated models also offer immersive VR and AR experiences, allowing for the remote exploration of heritage sites. This collection highlights the innovative approaches in digitization, visualization, and simulation, advancing these tools in architecture, engineering, and heritage preservation.

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