A Review on the Integration of UAV Technologies Across the Construction Lifecycle

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SUMMARY

The deployment of Unmanned Aerial Vehicles (UAVs) is increasingly reshaping practices in the building and civil engineering sector, offering enhanced precision, efficiency, and safety -review exploring UAV applications throughout the construction lifecycle, encompassing the pre-construction, construction, and post-construction phases. In the planning stage, UAVs support terrain modelling, topographic mapping, and environmental impact assessments. During the execution phase, drones contribute to real-time progress tracking, site supervision, stockpile volume calculations, and structural inspection, thereby strengthening project oversight and quality control. In post-construction phase, UAVs assist in generating as-built documentation, managing infrastructure assets, and integrating outputs into digital twins for long-term facility management. Despite their growing utility, prevailing challenges remain, such as regulatory restrictions, limited flight autonomy, data integration complexities with BIM/GIS systems, and the necessity for skilled operators. Prospective research opportunities are highlighted, including artificial intelligence (AI) powered automation, cloud-based real-time analytics, coordinated UAV swarms for large-scale tasks, and roles in advancing sustainable construction practices. By consolidating current findings, this review provides actionable insights into the evolving role of UAVs in construction and offers guidance for researchers, industry professionals, and decision-makers.

Keys words: Unmanned Aerial Vehicles (UAVs), Building and Civil Engineering, Construction lifecycle, BIM, Digital twins, AI.
