

Developing an advanced automated modular housing design system using deep learning and Building Information Modeling (BIM)

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ABSTRACT

Modular construction has the potential to increase the efficiency of on-site construction activities, as well as reduce capital costs, project duration, and construction waste. However, currently, critical issues in the design and pre-planning phases including longer lead-in time, lack of expertise, and flexibility of design hinder its extensive deployment in the AEC industries. To this end, this paper proposes a new methodology for automated generation and configuration of a modular building design by deploying Generative Adversarial Network (GAN) and Building Information Modeling (BIM) technologies. This paper focuses on spatial design in the early design phase. By incorporating the requirements and constraints of a modular building project needed for its life cycle into the automated design process, the proposed method can automatically provide feasible, constructible, and optimal modular design alternatives. The results of this study show that it is expected to significantly reduce the time and effort for designing a modular building and generating diverse design options that can efficiently fulfill the final user's requirements, functional requirements, and manufacturing and assembly constraints.