Optimizing The Residential Design Process Using Automated Technologies

Authors : Martin Georgiev, Milena Nanova, Damyan Damov

Abstract : Architects, engineers, and developers need to analyse and implement a wide spectrum of data in different formats, if they want to produce viable residential developments. Usually, this data comes from a number of different sources and is not well structured. The main objective of this research project is to provide parametric tools working with real geodesic data that can generate residential solutions. Various codes, regulations and design constraints are described by variables and prioritized. In this way, we establish a common workflow for architects, geodesists, and other professionals involved in the building and investment process. This collaborative medium ensures that the generated design variants conform to various requirements, contributing to a more streamlined and informed decision-making process. The quantification of distinctive characteristics inherent to typical residential structures allows a systematic evaluation of the generated variants, focusing on factors crucial to designers, such as daylight simulation, circulation analysis, space utilization, view orientation, etc. Integrating real geodesic data offers a holistic view of the built environment, enhancing the accuracy and relevance of the design solutions. The use of generative algorithms and parametric models offers high productivity and flexibility of the design variants. It can be implemented in more conventional CAD and BIM workflow. Experts from different specialties can join their efforts, sharing a common digital workspace. In conclusion, our research demonstrates that a generative parametric approach based on real geodesic data and collaborative decision-making could be introduced in the early phases of the design process. This gives the designers powerful tools to explore diverse design possibilities, significantly improving the qualities of the building investment during its entire lifecycle.

Keywords : architectural design, residential buildings, urban development, geodesic data, generative design, parametric models, workflow optimization

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