
Keywords: space layout, automatic generation, energy performance, optimization design, office building

Architectural Engineering + Technology Department (Climate Design & Sustainability)

Area of Research: Green Building Innovation

Research Summary: The space layout design is one of the most important phases of the architectural design, and the automatic generation of space layout has shown great potential as a design aid. Research has shown that space layouts can have a significant impact on the improvement of energy performance. The combination of the automatic generation of space layout and the optimization of energy performance is expected to be greatly helpful for the development of an energy efficient design in the early design phase. Although the potential of space layout generation to optimise energy performance seems big, it is not fully explored. Only several researches have tried to combine automatic generation of space layout with the energy performance optimisation. Besides, the current research lacks the integration of different aspects of energy performance. The automatic generation lacks the flexibility of shapes and 3D exploration of geometry, as well as the contemporary spatial typologies of office buildings. The aim of this research is to develop the methodology of automatic generation of space layouts of office buildings, with optimised energy performance, considering the integration of different aspects of energy performance, by focusing on the contemporary typologies of space layouts and requirements of office buildings.

Research Methodology: The methodology includes five steps. Firstly, literature review. Secondly, develop the integrated energy assessment method, which aims at assessing the energy performance with the integration of heating, cooling, lighting, ventilation. Thirdly, develop the automatic space layout generation model. Fourthly, assess energy performance of generated space layouts. Finally, optimise the space layouts of several cases.


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Main Question:
What is the relationship between space layout and energy performance of office buildings?
How can space layout be automatically generated to improve energy performance of office buildings?

Deliverables:

Link(s):

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