



**UNIVERSITY OF
CAMBRIDGE**

Department of Engineering

CONSTRUCTION ENGINEERING MASTERS DISSERTATION ABSTRACT

Housing as a Platform

Design and Implementation of a generative housing design tool for the mass customisation of housing

In this research project, a novel computational design framework and interactive web interface are demonstrated to enable the customisation of a house design. The aim of the research is to enable user participation for potential homebuyers through interactive means as part of the home design configuration process. Typically, with speculative means of housing provision, the homebuyer is provided with a ready-made product over which they have very little direct input or influence in terms of design or cost. Alternatively, the custom home design process can be time intensive in the development of a design solution. Today, research directions in digital fabrication, cloud based digital platforms and computational design techniques provide opportunities to investigate further how to enable user participation and customisation as part of the design process.

In this context, the design and implementation of a conceptual housing platform is investigated to enable the configuration of a house design. Firstly, a conceptual model is developed with the design and implementation of a novel computational design framework.

The computational method fuses a syntactic design methodology with an evolutionary solver to enable the generation of floor layouts. A three-dimensional representative model of the floor layout is then generated for further configuration. Secondly, the process is augmented further through connecting the algorithm with a web interface to enable the customisation process for an end user. A simulation and analysis of the computational design framework is conducted to determine its performance in producing viable floor layouts. Accordingly, the web interface is evaluated through a user study of the algorithm and functionality of the customisation process. The findings demonstrate an effective computational design approach in generating house designs. However, further development and testing of the computational design framework and interaction with a web interface are required to advance the research.

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