PolyU Design

PhD

THESIS SERIES

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A Design Method and Computational Architecture for Generating and Evolving Building Designs

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This thesis aims to contribute to the development of a practical evolutionary design approach, which allows a design team to evolve designs that they find surprising and challenging. Due to several fundamental problems, the evolutionary approach has had limited success in evolving complex designs' overall configuration and organisation. This thesis presents an overall framework that supports such an evolutionary design approach, and investigates and proposes how these problems can be overcome in regard to building design. The proposed generative evolutionary design framework consists of two parts: a design method and a computational architecture. The feasibility of the proposed generative evolutionary design framework is supported by a demonstration of encoding the design schema. Additionally, the generative process is used to define generative rules and representations implemented as a set of programs. These programs are then used to generate a population of three-dimensional building design models, thereby allowing the character and variability of the designs to be verified.