

# Design Agency

## Prototyping multi-agent systems in architecture

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**Abstract.** This paper presents research on the prototyping of multi-agent systems for architectural design. It proposes a design exploration methodology at the intersection of architecture, engineering, and computer science. The motivation of the work includes exploring bottom up generative methods coupled with optimizing performance criteria including for geometric complexity and objective functions for environmental, structural and fabrication parameters. The paper presents the development of a research framework and initial experiments to provide design solutions, which simultaneously satisfy complexly coupled and often contradicting objectives. The prototypical experiments and initial algorithms are described through a set of different design cases and agents within this framework; for the generation of façade panels for light control; for emergent design of shell structures; for actual construction of reciprocal frames; and for robotic fabrication. Initial results include multi-agent derived efficiencies for environmental and fabrication criteria and discussion of future steps for inclusion of human and structural factors.

**Keywords:** Generative Design, Parametric Design, Multi-Agent Systems, Digital Fabrication, Form Finding, Reciprocal Frames.