

# **Abstract**

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## **Architectural Space Planning Using Parametric Modeling: Egyptian National Housing Project**

The Egyptian government resorts to prototype housing for low-income citizens to meet the growing demand of the housing market. The problem with the prototype is that it is inadequate for everyone's needs. Consequently, users make modifications to the prototype without professional intervention because of the high cost. This paper discusses an automatic multi-stories space planning tool that helps low-income citizens to modify their prototype housing provided by the government. Social, spatial and functional design aspects were set in the original design prototype by an architect. The proposed tool simulates spaces spatial locations in the original design by simulating the analogy of mechanical springs through an interactive simulation of a parametric model. The authors developed the used algorithm in the generative design tool Grasshopper and the live physics engine Kangaroo, both working within the Rhino 3D environment. The algorithm has two versions, one-floor level version and two floors version targeting the wealthier users. Results indicate that this tool integrates with the exploratory nature of the design process even for non-professional users. The authors designed a tool that will help the users to study the effect of the desired modifications against the originally provided prototype, it also makes it easier for users to express their requirements to a professional designer, conserving time and financial cost.