Achieving the Harmonic Forming of Interior Design & Furniture Elements through Algorithmic Theories

Associ. Prof. Dr. Diaa El-Din Mohamed Amin Tantawy

Associate Professor, Interior Design and Furniture Department, Faculty of Applied Arts - Helwan University

diaatantawy@hotmail.com

Dr. Ahmad Mohamed Mohamed Ibrahim

Lecturer, Interior Design and Furniture Department, Faculty of Applied Arts - Helwan University

ahmad_ibraheem@hotmail.com

Researcher. Dina Mohamed Abdel Mohsen

Interior Designer

dinaselim.id@gmail.com

Abstract:

An algorithm is a computational procedure for addressing a problem in a finite number of steps. It involves deduction, induction, abstraction, generalization, and structured logic. It is the systematic extraction of logical principles and the development of a generic solution plan. Algorithmic strategies utilize the search for repetitive patterns, universal principles, interchangeable modules, and inductive links. The intellectual power of an algorithm lies in its ability to infer new knowledge and to extend certain limits of the human intellect.

Despite the proliferation of computers in architecture today, the use of algorithms in architectural design is generally limited. Instead, the dominant mode of utilizing computers in architecture today can be identified as that of computerization, i.e. that where entities or processes that are already conceptualized in the designer's mind are entered, presented, or stored on a computer system. In contrast, algorithms, as process of creating design solutions by the use of mathematical or logical methods, are generally limited. While the research and development of software itself involves extensive algorithmic techniques, mouse-based manipulations of 3D computer models on a computer screen are not necessarily algorithmic processes.

As mentioned before, AD allows the generation of forms and shapes through algorithms. In particular, a category of algorithms aimed at producing unpredictable results quickly triggered designers' interest, allowing them to explore new uncharted formal territories in architecture. Shape grammars, mathematical models, topological properties, genetic systems, mappings, and morphisms are a few examples of algorithmic processes explored for their unpredictability.

By combining this flexibility of AD with analysis and simulation softwares, design alternatives can then be analyzed and compared with relative simplicity to select a solution that offers optimal performance. This allows the designer to prioritize performance early in the design process, or even let it lead the process, and presents a massive shift from traditional design methodologies, where performance evaluations are typically done at the end of the process, making it rarely a priority. These optimization procedures are not only restricted to technical aspects of the design performance such as structure, thermal behavior, acoustics, and

aerodynamics; they can also include other aspects such as material usage, spatial distribution, among others.

Finally, AD also enables the automation of repetitive, time-consuming tasks that had to be manually executed before, such as repetitive modelling or fabrication processes. This relieves architects from tedious and error prone work, allowing them to save a lot of time and effort during the design process.

Keywords:

Algorithms - Algorithmic architecture - Algorithmic design AD - Generative design - Digital fabrication.