



# Perspectives on Artificial Intelligence and Computation in Design

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Negroponte (1970) stated, “This progressively intimate association of the two dissimilar species (designer - machine) is the symbiosis. It evolves through mutual training, in this case, through dialogue.”

Designers engage in cognitive processes of divergent thinking for idea generation and exploration, and convergent thinking for scrutinizing and selecting the most suitable design solutions based on the given problems and conditions. Computational supports are designed to automate these divergent and convergent cognitive processes, aiming to offer relevant support. Design is an action aimed at problem-solving, characterized as an explanatory process and supported by creativity to foster innovation through reflection. Designers iteratively incorporate newly acquired information to update problem definitions and expand the scope of their designs.

With recent advancements in generative artificial intelligence (AI), computational support has been utilized to aid and even automate various key phases of the design process. Design support systems have been developed to align with the sequential stages executed by human designers. However, the advancement of AI in design has fundamentally transformed the design landscape, including the tools and systems that designers use. It is clear that the time has come to investigate the interaction between designers and these systems. This interaction has become increasingly intricate, necessitating the ability to redefine design problems, scopes, and directions in real time, regardless of the process sequence.

Unanticipated “intelligent” computational supports now facilitate designer-AI interactions throughout the entire design cycle, fostering dynamic and spontaneous interaction rather than a linear progression. In this respect, the role of human input and collaboration in the context of artificial intelligence in design is crucial. It provides an understanding of how designers can actively participate in the automated design process, leveraging their expertise and creativity to enhance outcomes. It investigates methods to strike a balance between automation and human intervention, ultimately aiming to optimize the synergy between human designers and computational systems.

Additionally, computational methods are utilized to gain insights and deepen our understanding of the design process. By employing algorithms, simulations, and data analysis techniques, we aim to uncover patterns, relationships, and underlying principles in design. The goal is to leverage computation as a tool for discovering new design approaches, improving design methodologies, and fostering innovation in various domains. Lastly, as AI in design can change the design industry, it can also impact pedagogical contexts. It is important to examine how computational methods and technologies can enhance efficiency, productivity, and quality in both design and educational processes. This encompasses areas where AI can streamline workflows, optimize resource allocation, and facilitate decision-making.

This is the first Special Issue of the Archives of Design Research journal, aimed at exploring ways to facilitate designer-AI interactions. The papers in this special issue reveal how artificial intelligence can impact design beyond our current reach. They attempt to incorporate AI into the creative processes of various design domains, including architecture, product design, graphic design, fashion design, and film. Moreover, the papers open up new and interesting research areas triggered by the convergence of AI in the design domain and traditional industries. These include AI design thinking education for children, user interests in the metaverse, AI-driven frameworks for virtual workspace design, AI for disability, and autonomous vehicle design for anxiety relief.

The studies presented in this special issue highlight a new perspective on the future integration of design and artificial intelligence. It is emphasized that designers and AIs need to continuously redefine design goals together. These papers offer stimulating, challenging, and sustainable insights, serving as a precursor to a more comprehensive understanding of the future roles of designers and AI in the creative process.

## References

1. Negroponte, N. (1972). *The Architecture Machine: Toward a more human environment*. The MIT Press.