SYNTHETIC REALITIES

New Frontiers in AI-driven Design, Fabrication and Materiality

MANUEL KRETZER *(Ed.)*

'Do we ever have to understand anything again? When all that can be learned through hard work and persistence is replaced by these new synthetic tools, what are we left with?'

The profoundly important essays contained within this volume confront the disruptive impacts of artificial intelligence on the world of architecture and design. *Synthetic Realities: New Frontiers in AI-driven Design, Fabrication and Materiality*, edited by Manuel Kretzer, contains deep reflections from many of the leading AI thinkers and activists in the world today. For everyone striving to come to terms with the upheavals of AI in the design of the built environment this book is essential reading.

Prof. Philip Beesley
Multidisciplinary Artist, University Professor and Pioneer of Living Architecture

As we hurtle forward into an age of Artificial General Intelligence, it is vital that we reflect on our own material realities - our synthetic realities - and consider how they are being transformed by the immaterial world of artificial intelligence. This book, including essays by a range of internationally renowned practitioners, educators, and creatives, represents a ground-breaking journey into the transformative power of artificial intelligence within the realms of design and architecture.

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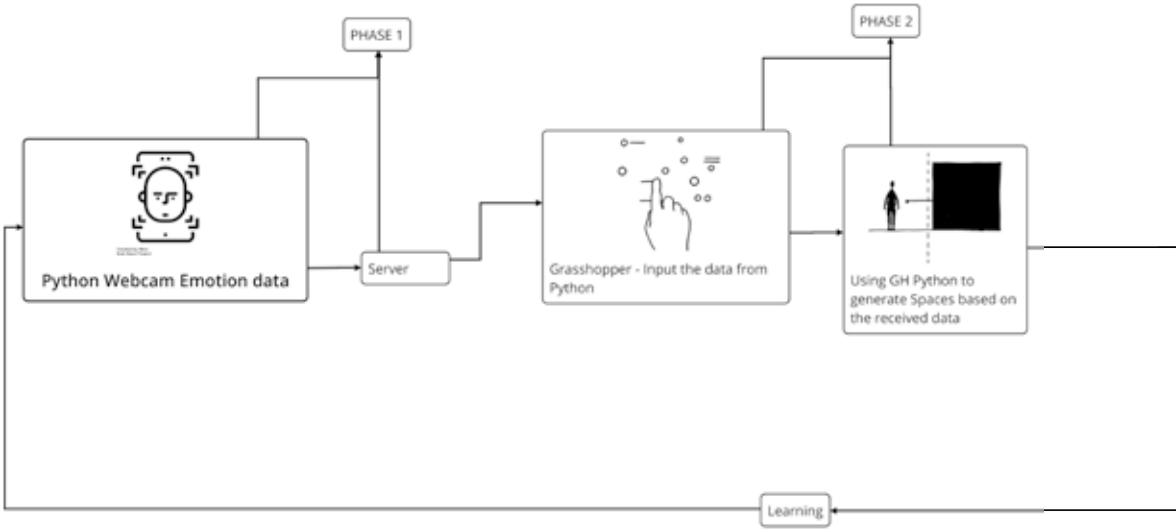
CONTENT

and certain use and geometry patterns for the local conditions. The comprehensive integration of such methods, and especially the incorporation of AI, will lead to fundamental shifts in the way we design, model and create our environment in the near future.

Two further projects with significant potential for integrating AI processes are the MID student projects 'Nexus – Generative Processing of Residual Materials' and 'Building Game – AR-based Generative Clay Building Game', developed by the student initiative 'dmC – digital methods Collective' (A. Vinogradova, A. Badr, A. Stan, L. Schumpich, L. Gutierrez, G.Y. Denktas, M. Khaled). Both projects have a strong emphasis on digital physicalization, placing a focus on material, digital construction and assembly. The first project focuses on a generative assembly process, supported by object aggregation and mesh topology optimization. The tool prototype generates variations of architectural structures using 3D scan data of random wood remnants and leftover material [Fig. 30]. The project is strongly inspired by the digital design tools used for the works of studio 'certain measures' based in Berlin, and has been supervised at the Detmold School of Design by Andrea Kondziela.

Fig. 30 P. 89

In such projects AI brings in the potential to optimize individual modelling procedures with random items by leveraging its knowledge of physical assembly and construction. The developed prototype of 'Nexus' underscores the need for additional research into how AI can facilitate the automated design process. This involves not only integrating design and construction parameters into the modelling process but also enhancing interaction with the user, developer or creator of the project. This necessitates significant further exploration and development of the interfaces between the user and the construction and design algorithms, with a particular focus on the collection, evaluation and processing of 'big data' from 3D-vector models including, for example, values on material and construction. Moreover, there must be a strong focus on transparency, user interaction and optimization. This study also raises a critical question: who actually was the designer of a generated output, and to what extent has it automatically evolved in a software tool? Will the software developer, a user, a computer or an AI program be the designer?

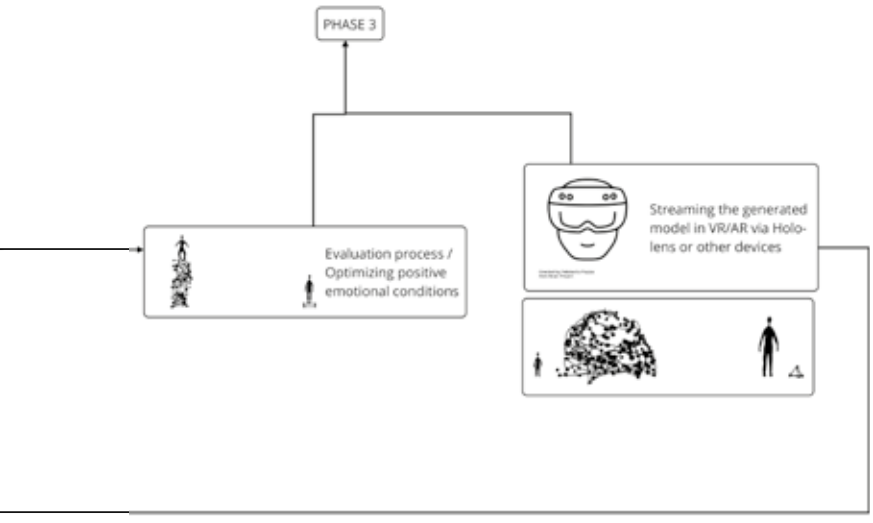


An 'Ecology of Architecture'

The concept of architecture, as integrated art and technology, is critical in understanding our relationship with the world. James Bridle's idea of an *'Ecology of Technology'* (Bridle 2022) implies that everything, including the tools and technology we create, is part of the 'more-than-human world', a term coined by ecologist David Abram (2012), and has its own agency. This concept should challenge us to rethink the way we design and interact with our built environment.

Architecture, as a discipline that heavily involves the use of tools and technology, is a significant part of this integrated ecology. The buildings and spaces we create are not just passive objects; they are active participants in our collective becoming, influencing our behaviour, well-being and relationships with others. Therefore, we can indeed speak of an 'Ecology of Architecture', where the built environment is seen as an integral part of the broader ecological web, with its own agency and the capacity to shape and be shaped by its surroundings.

This perspective calls for a holistic approach to architectural design research, one that considers not only the human needs but also the impact on and relationship with the natural environment and the technological tools used in the process. It suggests that architecture, technology and their environment are not separate entities but deeply interconnected parts of the same ecological system, and should be treated as such in the design and construction processes. In this regard AI can help us better understand and respond to the complex interconnections between humans, the built environment and the natural world. It can enable us to analyse vast amounts of data to uncover patterns and insights that would otherwise be impossible or extremely time-consuming to identify.



◄ **Fig. 28:** Possible future vision of the integration of 'MAZE' in an architectural design process

◄ **Fig. 6:** Lucy Dökel, visualisation of AI (as a humanoid figure) spreading into human minds, across the man-made environment and into nature, generated in Midjourney, 2023.

► **Fig. 8:** Hoang Son Nguyen, character, environment and story play design using various generative AI tools in different media, 2023.

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Synthetic Realities: New Frontiers in AI-driven Design, Fabrication and Materiality is an impressive volume bringing together leading architectural designers, educators, and thinkers to explore artificial intelligence as a creative practice. It integrates a breadth of discourses that inform design ideation, new materiality, and emerging social contexts. It asks how automation changes the underlying infrastructures of creativity, its representation, instrumentalization, and poetics and delves into the ways AI, within the entangled boundaries of digital and physical realms, is reshaping creative fields and redefining the boundaries of materiality and aesthetics.

This book critically examines how emerging technologies foster new forms of expression and innovation. It offers new narratives to understand the intersection of biology and digital technology, revealing cutting-edge material innovations and bio-digital synergies, and providing compelling perspectives on the symbiosis of artificial and organic elements. *Synthetic Realities* challenges architecture as a creative practice to reconsider its understanding of the relationship between humans, technology, and creativity. It is a must-read for visionaries, enthusiasts, and anyone interested in the future of design and architecture.

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Synthetic Realities embarks on a groundbreaking journey into the dynamic landscape of design, art and architecture in the era of artificial intelligence. Edited by Manuel Kretzer and authored by a group of global experts, educators, and thinkers, this collection provides a sweeping overview of how AI is reshaping creative fields, blending the digital with the physical and redefining the boundaries of materiality and aesthetics. The book explores the profound influence of digitization on creative processes, critically examining how emerging technologies foster new forms of expression and innovation. It navigates the exciting intersection of biology and digital technology, revealing cutting-edge material innovations and bio-digital synergies. Beyond redefining aesthetic and spatial experiences in our digitized era, this volume offers fresh, compelling perspectives on the symbiosis of artificial and organic elements. Concluding with insightful philosophical reflections, *Synthetic Realities* is an intellectual odyssey that challenges readers to reconsider their understanding of the relationship between humans, technology and creativity. A must-read for visionaries and enthusiasts, or anyone interested in the future of design and architecture, it beckons you to expand your perspectives and immerse yourself in the limitless possibilities that AI introduces to the worlds of creative endeavour.

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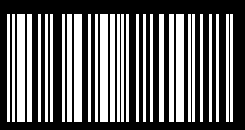

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