The End of Robotics in Architecture (as we almost got to know it)

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Abstract
This paper examines the value of several current directions being explored in architectural robotics and marshals them towards a future vision. The future outlined in this paper will most certainly involve re-examining and adjusting scale, whereby it will become increasingly possible for future robotic systems to be built of nanotechnological, and bionanotechnological means. These new interactive assembly systems will potentially bring new unprecedented levels of customization and re-configurability.

The paper begins by examining current works in architectural robotics that are focused on compositions of discrete systems or devices and compares them to the interactive possibilities of the internal scale of the materials that compose the building itself.
Next, the paper looks at the value of decentralization in architectural terms and how such strategies can potentially play a powerful role when local interactions between individual components can lead to the emergence of global behavior. We then examine the value of modular reconfigurable robotics and the potential of architects understanding ways to apply them to dynamic situational activities and build them into systems that make up architectural space. The paper continues with an examination of the value of

architectural space-making, arguing that there are many important lessons to be learned in applying both decentralization strategies and modular reconfigurable robotics into a future paradigm of architectural space-making. The paper also examines, though numerous examples by the author, the value of prototyping at human scale and the lessons that can be learned by creating full-scale environments that people can walk through, interact with, and experience spatially. Lastly the paper looks at the value of biomimetics, and argues that such research is currently fostering an organic (as opposed to the mechanical) paradigm of adaptation spurred on by a wealth of explorations in the area. The paradigm is referred to here as the architectural application (as opposed to the acquisition) of developments in robotics and materials. Today we have a compressed technology transfer of modes of production and design methodologies tied to form-making that bring innovations in materials to architectural reality faster than ever. Furthermore, there are numerous advancements in both robotics and new materials whereby the adaptation becomes much more holistic, and operates on a very small internal scale. Evolutionary systems describe such processes of biologically inspired architecture as those that operate like an organism, directly analogous with the underlying design process of nature. The important thing here is that evolutionary systems reposition the role of the designer. As Pask (2000) states in his foreword to the book, An Evolutionary Architecture: “The role of the architect here, I think, is not so much to design a building or city as to catalyze them: to act that they may evolve.” The paper argues that architects should be informed of these developments to understand what is possible, and how to extrapolate from these ideas and technologies in order to create a vision for the future of their profession. Architects must change their general preconceptions of robotics with respect to scale to understand the potentially profound role in architecture. Architects can then formulate the basis for a physically dynamic architecture that arises out of human needs, and which is supported by an improved understanding of biological systems.

The title is not meant to suggest that we are wasting our time with current research in architectural robotics but that possibilities in interactive architecture from the vantage point of a biological paradigm make the mechanical paradigm seem dated, ironically before it ever had a chance to fully manifest itself into the built fabric of our everyday lives. We are witnessing the beginning of a paradigm shift from the mechanical to the biological in terms of adaptation in architecture that can be seen as the end of robotics (as we almost got to know it). Architectural robotics will eventually become truly seamless.

Keywords
Interactive Architecture; Modular Robotics; Robotics; Kinetics; Biomimetics