

The Influence of Human Movement on the Formation of Adaptive Architecture

Authors : Rania Raouf Sedky

Abstract : Adaptive architecture relates to buildings specifically designed to adapt to their residents and their environments. To design a biologically adaptive system, we can observe how living creatures in nature constantly adapt to different external and internal stimuli to be a great inspiration. The issue is not just how to create a system that is capable of change but also how to find the quality of change and determine the incentive to adapt. The research examines the possibilities of transforming spaces using the human body as an active tool. The research also aims to design and build an effective dynamic structural system that can be applied on an architectural scale and integrate them all into the creation of a new adaptive system that allows us to conceive a new way to design, build and experience architecture in a dynamic manner. The main objective was to address the possibility of a reciprocal transformation between the user and the architectural element so that the architecture can adapt to the user, as the user adapts to architecture. The motivation is the desire to deal with the psychological benefits of an environment that can respond and thus empathize with human emotions through its ability to adapt to the user. Adaptive affiliations of kinematic structures have been discussed in architectural research for more than a decade, and these issues have proven their effectiveness in developing kinematic structures, responsive and adaptive, and their contribution to 'smart architecture'. A wide range of strategies have been used in building complex kinetic and robotic systems mechanisms to achieve convertibility and adaptability in engineering and architecture. One of the main contributions of this research is to explore how the physical environment can change its shape to accommodate different spatial displays based on the movement of the user's body. The main focus is on the relationship between materials, shape, and interactive control systems. The intention is to develop a scenario where the user can move, and the structure interacts without any physical contact. The soft form of shifting language and interaction control technology will provide new possibilities for enriching human-environmental interactions. How can we imagine a space in which to construct and understand its users through physical gestures, visual expressions, and response accordingly? How can we imagine a space whose interaction depends not only on preprogrammed operations but on real-time feedback from its users? The research also raises some important questions for the future. What would be the appropriate structure to show physical interaction with the dynamic world? This study concludes with a strong belief in the future of responsive motor structures. We imagine that they are developing the current structure and that they will radically change the way spaces are tested. These structures have obvious advantages in terms of energy performance and the ability to adapt to the needs of users. The research highlights the interface between remote sensing and a responsive environment to explore the possibility of an interactive architecture that adapts to and responds to user movements. This study ends with a strong belief in the future of responsive motor structures. We envision that it will improve the current structure and that it will bring a fundamental change to the way in which spaces are tested.

Keywords : adaptive architecture, interactive architecture, responsive architecture, tensegrity

Conference Title : ICEABC 2020 : International Conference on Eco-Architecture and Bio-Construction

Conference Location : Dubai, United Arab Emirates

Conference Dates : March 19-20, 2020