

THE INFLUENCE OF DIGITAL ARCHITECTURE ON VIRTUAL FURNITURE DESIGN

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Abstract. This exploration attempts to address a new concept, a condition in which digital architecture has started to have a significant impact on the ways in which we live and design. Working practices, social interaction and many other facets of contemporary life have been radically changed. As a time when architecture is becoming digital through the use of computers in the design process and the architecture has become digital through an increasing application of three-dimensional simulated environments to understand and navigate digital information in space. The digital and architecture are being invisibly integrated in a process that is not even apparent to most architects. It makes us aware of the many opportunities that exist between these two design approaches. Instead of trying to validate conventional design thinking in a different realm, the strategy should be to infiltrate design with other media and disciplines to produce a new crossbreed profession. Through an exploration of outstanding digital architecture the detail of generative form, sculptural and curvaceous form, and zoomorphic form, which will have a significant impact on virtual furniture design, can be discovered. Keywords: Digital Architecture, Virtual Furniture Design, Zoomorphic

1. Introduction

It's the information revolution that is metamorphosing architecture and urban design. Digital technologies are transforming the nature and intent of architecture and creativity, blurring the relationships between matter and data, between the real and the virtual and between the organic and the

inorganic and leading us into an unstable territory from which rich, innovative forms are emerging. At the end of 20th century, humanity's concept of space has suddenly experience a great change with the arrival of the internet. Cyberspace or networked space now exists alongside actual space. Computer simulation technology has allowed building to be create in virtual space that were never intended to actually be constructed. This virtual space has not only influenced the direction of architectural design, but has overturned our existing spatial theories.

1.1. DIGITAL ARCHITECTURE

Architecture as traditionally understood has become more marginalized than before. Many practices, however, have been repositioning themselves to take advantage of the new opportunities beyond the bounds of traditional architectural practice. Design, practice, fabrication and construction are increasingly becoming networked affairs. The new measures of architecture are connectivity and speed. The architecture of a new world needs to recognize these transformations and think differently.

1.2. VIRTUAL FURNITURE DESIGN

Since the digital architecture has a momentous transformation in architecture design. It's essential to explore on components of digital architecture and digital interior. Virtual furniture design is a new concept of design method, thinking, and process which is a mirrored development in architecture and technology and reflects the changing needs and concerns of society in the digital era. There are two main possibilities: primarily, to design the furniture for the digital architecture; secondarily, to design the furniture in the virtual space (Lin and Hsu, 2003) in which customers can customize the furniture on the web. This article is grounded on the trend of digital architecture, which is related to furniture design.

Interactive 3D brings products to life and gives users the opportunity to visualize the image and interact with it. Users are able to rotate a product 360 degrees to view it from all angles, zoom in to see all details, explore all of the features and functions in order to make an "educated" and "involving" purchasing decision. Internet web 3D will be the platform for the communication interface between consumer and designer. Figure 1 demonstrates the application of Interactive 3D on the Virtual Furniture Design.

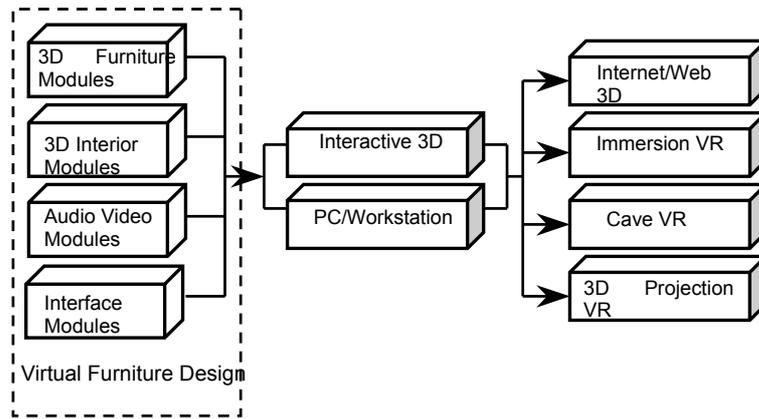


Figure 1. The method of Virtual Furniture Design

2. The Representatives of Digital Architecture

In 1990, Frank Gehery used computer to assist him to design free-forms, and then utilized CAD/CAM to quickly draw plans for the structures and actually build them. The digital design media and digital construction methods have liberated form and space in architecture, and have turned architecture into more of pure art form than previously (Liu, 2001).

2.1. VIRTUAL NEW YORK STOCK EXCHANGE

In the mid 1990s, the New York Stock Exchange (NYSE) set out to integrate its vast storehouse of computer data into a single, user-friendly, computer accessible system. The NYSE designed by Asymptote (Waters, 2003). Using an architectural approach, Asymptote designed a three dimensional, fully interactive, virtual environment that closely mirrors the physical and geographical layout of real trading floor. Asymptote's 3-D Trading Floor (3DTF) is the financial world's first large scale, virtual operational control center. It collects transactional and network activity data, and displays it on a high resolution video wall in the form of an animate, real time, 3D representation of the physical trading floor.

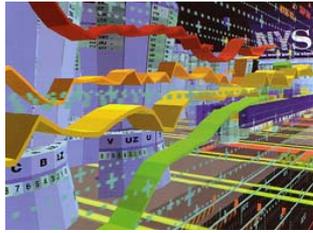


Figure 2. 3D Interactive virtual New York Stock Exchange designed by Asmptote



Figure 3. The 3D Trading Floor is the financial world's first large scale

The fully interactive 3DTF consolidates several data streams and presents them in a virtual environment that allows for the manipulation of spatial and temporal dimensions. Stock prices, news, indexes, and live video from major television networks are constantly flowing into the virtual environment, where they are presented in real time on ticker bands and video displays on the “wall” of the space. Virtual trade booths, arranged in the same position they occupy in the real world, are set up on the “floor” of the 3DTF, providing users with a familiar layout. An interactive 3D graph sits in the virtual floor, which allows for instant replay of graph even that occurs in the stock market. Asymptote used Maya software, the Cosmo Worlds Virtual Reality Markup Language, Photoshop, and Premiere to build the interface.

2.2. THE GUGGENHEIM VIRTUAL MUSEUM

The Guggenheim Virtual Museum may be the largest three dimensional, interactive environment of its kind. The purpose of this museum in cyberspace is not merely to convert paintings and videos into digital objects, but also to serve as a home for a growing number of modern works that are digital in nature that can only be viewed on computers (Graphic Image Studio, 2001).

This idea that the digital realm is a place is what we make it possible for architects to ply their trade there. The most important defining element is the notion that the virtual architecture is a space. It's not a dynamic graphics representation of text and image. It possesses a kind of destabilized spatiality. Even concepts like walls, floors, inside, and outside may be accepted or ignore in this fluid terrain of infinite possibility.



Figure 4. 3D The Guggenheim Virtual Museum developed in 1999

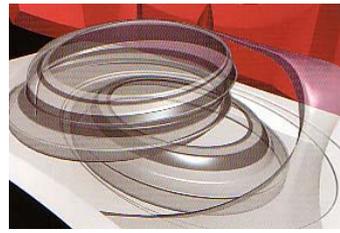


Figure 5. Plaza ring study for virtual fly through to entry area

2.3. THE FEDERATION SQUARE

Federation Square is a large-scale civic development, occupying 3.5 hectares, and is currently located in the center of Melbourne, Australia. The project is a complex mix cultural institutions, civic space, and commercial activities. Federation Square attempts the creation of a new urban order, capable of adapting to changing activities and social programs, whilst maintaining real links to an existing metropolitan context. This ambition is approached by strategies that produce coherence out of difference and materialize the invisible connections so essential to any dynamic urban center. In the true spirit of Federation, this design brings together distinct elements and activities, forming a complex ensemble based upon the unique and the collective.

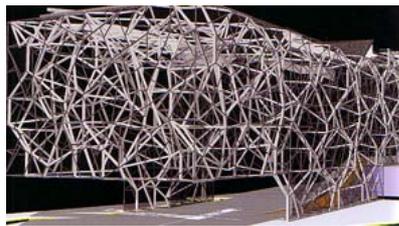


Figure 6. The Federation Square study render of atrium



Figure 7. Internal perspective of south atrium

3. The Features of Digital Architecture

The digital architecture has been changing the design procedure, methods, materials, and appearance of architecture, which are related to virtual furniture design. There are three main features: generative form, sculptural and curvaceous form, and zoomorphic form.

3.1. GENERATIVE FORM

Time perhaps as an impediment to building has assumed a decidedly intimate role in an architecture that engages in a kinematics sculpting of space. Today, time and movement have been instrumentalized in architecture with the aid of powerful animation soft wares, which have enable architecture to develop dynamic, mutable and evolving design techniques and new spatial paradigms (Graphic Image Studio, 2001).The use of animation software has inscribed duration and motion into static form.

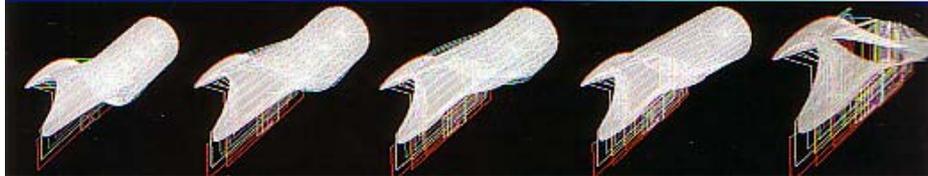


Figure 8. Paramorphosis: sequential relaxing of 'parametric tube'

These architects view spatial design as a highly plastic, flexible art in which the building form itself continuously evolves through motion and transformation. With complex time sequence and simulations, forms are no longer defined by the simple parameters of scale, volume and dimension. Figure 8-9 show the project has been develop for an architecture/art competition to devise a gateway to the cultural center of the South Bank in London.

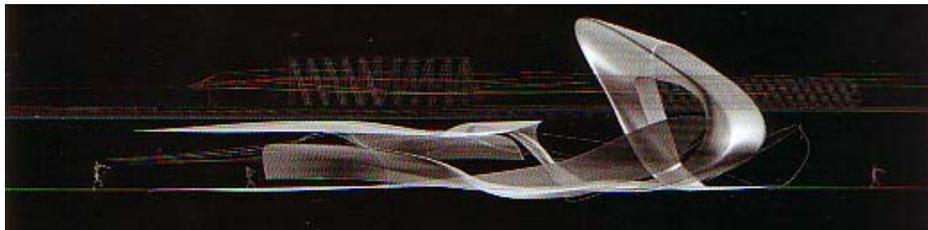


Figure 9. Sectional view of final design

3.2. SCULPTURAL AND CURVACEOUS FORM

Non-Uniform Rational Bezier Spline (NURBs) modelers represent a further refinement for digital architecture. They are considered much easier to work with because user can manipulate the surfaces of their models by moving virtually any point on the form. The NURBs offers architects easy create different kinds of free form architecture. Fig 9 is the project for Sarajevo

Concert Hall Competition. Figure 11 is the Martial-Art Headquarter by William Hsien.

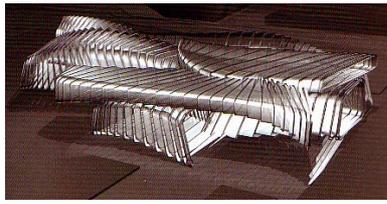


Figure 10. Sculptural form of Digital architecture

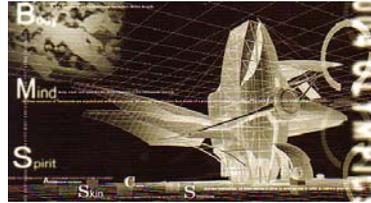


Figure 11. Curvaceous form of Digital architecture

3.3. ZOOMORPHIC FORM

Biomorphism, a term coined during the Art Nouveau period, remains more specific than ‘organic’, but suggests that it is only shape that matters, whereas it are also patterns and mechanisms of building use and operation derived from biological models that interest a number of architects today. (Hugh, 2003) Sometimes, animal forms are employed for symbolic and metaphoric reasons, sometimes because nature inspires an idea of structure or skin or building function. These projects provide the most astonishing examples of this new trend, and the most persuasive evidence of digital architecture’s new turn to nature. Figure 12 shows the Grafton New Hall, an art gallery in which a cinema, a swimming pool, and guest and master bedrooms are appropriately located along the limbs of this radically reinterpreted country house according to the angle of the sun at the time of day they would be used. Figure 13 shows another similar case, Carara National Park, designed by Arca del Mundo, a tourist attraction on the theme of ecology commissioned by Costa Rica government. The main body of the building comprises a series of bulbous chambers of contemporary art and local culture arranged around a central space.



Figure 12. Grafton New Hall, 2001- Grafton, Cheshire, England

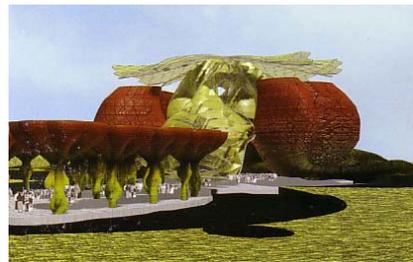


Figure 13. Arca del Mundo, 2002- Carara National Park, Costa Rica

4. The Relationship Between Digital Architecture and Virtual Furniture Design

The success of particular furniture has always depended on the quality and range of the connections it makes, or the designer is able to make through it, while addressing a specific need. At the functional level, furniture makes physical and psychological connections with its form and material. At the same time, it may embody meanings and values which connect with the user at an intellectual, emotional, aesthetic, cultural and even spiritual level. Over the past 150 years, the evolution of the chair has paralleled development in architecture and technology and reflected the changing needs and concerns of society to such an extent that it can be seen to encapsulate the history of design (Charlotte & Fiell, 2000).

Architects have always been closely associated with furniture design through their abilities to solve problems of structure and to make and exploit connections. In the quest for greater unity of design, architects such as Charles Rennie Mackintosh, Frank Lloyd Wright, Alvar Aalto, Frank O. Gehry and Carlo Mollion included chairs within their artistic schemes for interiors and buildings.

The digital architecture has been changing the design procedure, methods, materials, and appearance of architecture, which are those factors related to Virtual furniture design (Figure 14).

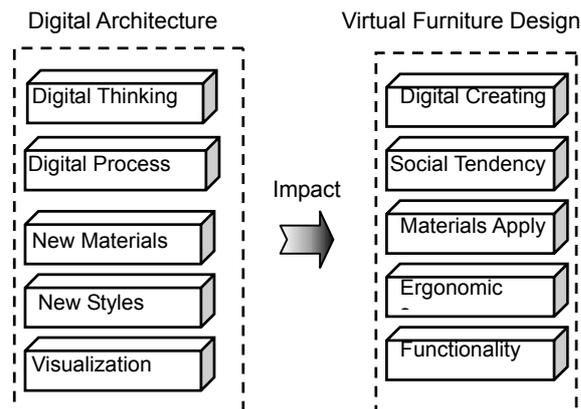


Figure 14. Factors between digital architecture and virtual furniture design

4.1. THE GLEAM OF FREE FORM PRODUCT DESIGN

Designers such as Ettore Sottsass and George Sowden, who came together in 1981 to form the Memphis design group. Their works displayed a particularly rebellious quality. The group designers included Michele de

Lucchi, Andrea Branzi, and Michael Graves. Their primary goal was to revive Radical Design, and their work all but exploded with bright colors, bold patterns, and materials the design world had not seen before. They employed neon, exotic veneers, and wildly patterned plastic laminates to break with conventional form and poke fun at the seriousness of functional designs.

4.2. THE CHANGING ON VIRTUAL FURNITURE DESIGN

We could conclude that Furniture Design must maintain the balance between art and technology, between shape and function, between aesthetics and ergonomics, and between body and soul. Figure 15 tries to discover the main factors to the Virtual Furniture Design.

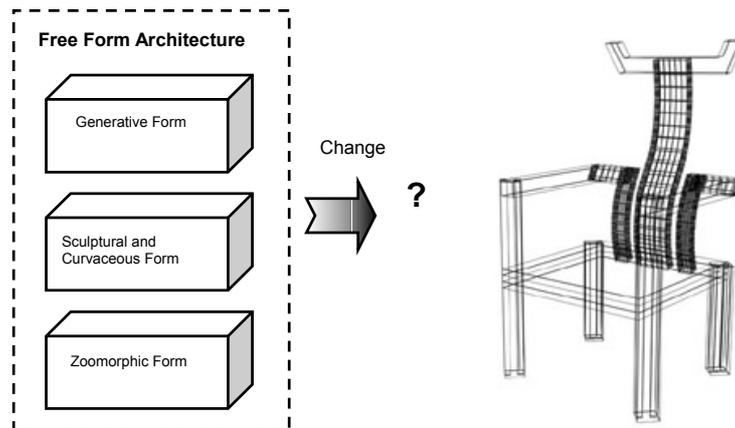


Figure 15. The searching for coordination between the free form architecture and furniture design

The A3 workstation is an 11 square meter freestanding biomorphic cockpit composed of soft, molded curves. The shell is composed of removable translucent nylon fabric stretched over rounded aluminum frames. With their orange, yellow, and blue accents, the movable modules are almost tent like. Mobile pedestal units can double as secondary work surfaces (Waters, 2003). All accessories, including letter trays, pencil cups, and a coat hook, are anchored to the frame. The design of the overhead storage was inspired by forms of airliner storage bins. It used semi-transparent screens to help achieve a balance of openness, lightness, and privacy. The workstation have a side entrance instead of traditional front or back opening. Grouped

together, the organic form factors of the modules allow for office planners and designers to group them to create alcoves, breakout spaces, impromptu gathering spots, and meeting areas. The A3 reflects the reading we made concerning not only the way we communicate and inhabit but also the desires and wants we have when we are able to freely maneuver our way through data, art, relationships and so on.



Figure 16. A3 Furniture Systems project, Asymptote used their digital design approach to rethink the office landscape



Figure 17. With their orange, yellow, and blue accents, the movable A3 modules are almost tent like.

5. Conclusions and Perspectives

The digital architecture has been playing an important role not only in architecture design field but also in visual communication design and virtual product design field. Through the exploration these conclusions are as follow:

- (1) The digital architecture is a new representation on visual information design.
- (2) The digital architecture could be coexisting with real architecture.
- (3) The generative form will give digital architecture more dimensions on creation new form of representation.
- (4) The digital design media and digital construction methods have liberated form and space in architecture, and have turned architecture into more of pure art form than previously.
- (5) The virtual furniture in the digital architecture will lead to a more free form design style.

The digital architecture has an immense impact in our daily life and in the cyberspace. The virtual product design is not what they used to be. The virtual product could apply in real life, cyber space, and game design Industry.

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