Architecture and Cyberspace

Audra Magermans

Introduction

In this new century, we are forced to re-examine certain aspects of the education and practice of architecture, as well as what constitutes our notion of three-dimensional spaces designed for the human experience.

As the digital world expands, we find that the study and practice of architecture become more complex. A rigorous investigation of the possibilities of architecture in a digital space requires an understanding of cyberspace and of the different tendencies of three-dimensional calculation. You can predict, without any doubts, an era of complexity in the education and practice of architecture.

All of the rules of digital design will change, forcing a re-evaluation of the architect's role in the digital era.

The architects of this new century need to keep up with technological advances in order to make the most out of the practice of architecture by taking advantage of the new design tools at their disposal. Currently many architects see visual computation of architecture as a simple representation and they ignore its potential. They need to see beyond this notion and start seeing it as the architecture itself.

Due to the introduction of the computer into the architectural environment, this question has arisen: is the object created in the computer only a representation? Certainly not. In fact, a complex model generated by the computer, more than a representation or an idea that we have formed of the external world or of a certain object, is a simulation, that is to say an appearance of something that is not, and it is more near the reality of what can be imagined. To this point, Nicholas Negroponte states "the real thing is not an expression of itself, it is itself." (Negroponte, 60)

The architect and philosopher Paul Virilio argues that "after the seduction of the simulation comes the disappointment of substitution." (Virilio, 103) With this he means that preferring the virtual being over the real being is the same thing as to "take the shadow for the substance … to prefer the metaphor, the clone to a substantial being." (Virilio, 103)

I recognize the ambiguity of the role that cyberspace can play in architecture which provides the design and practice of architecture with different options. Therefore it is my intention to test and analyze the two major qualities that I can see in the junction between cyberspace and architecture through the use of virtual reality. In the first case, virtual reality is treated as only a tool and in the second case it is treated as a space.

The role of cyberspace

The concept of cyberspace can be restricted to that of a digital space in which we are momentarily present. Cyberspace is accessible to anyone who is able to consciously project their presence inside of it. Its shape is based on our own visions of form in the digital, visual, or imaginary space. This means that cyberspace is not an isolated and inaccessible world; but rather this world is within reach of everyone; the only requirement is to have the equipment (computer and tools) and simple directions to follow.

According to Peter Anders, "in cyberspace, all objects are symbolic. On a different scale they make reference to the physical world alluding to it often through metaphors. This connection is necessary to help the user guide itself inside the symbolic space. Our scale of abstraction helps us to understand the connections to our physical world, showing forms to classify the objects of cyberspace and to understand its meanings." (Anders, 47)

Any object in cyberspace can have one or more meanings and its characteristics can be variable. A cyberspatial architecture is definitively a semiotic type of architecture, but the simbology can be infinite. The task of the cyberspace architect is to insinuate the semiotic codes that produce meaning so that the user won't get lost in a world of many symbols that are very difficult to understand.

The role of virtual reality

The concept behind virtual reality is the one of transmitting a sensation of "being there." (Negroponte, 117) The effect of virtual reality is achieved when disconnecting the person of its physical atmosphere, substituting it completely for a virtual one, electronically built, where the geometry of the space allows a projection free of obstructions, which has an important effect in the architectural perception.

Our perception of the world is three-dimensional. For this reason we are attracted to the three-dimensionality. The advance toward the virtual world is accelerating, and there is growing evidence of its commercial viability. VRML became, overnight, a standard for the modeling and publication of three-dimensional spaces that can be experienced in real time through the Internet.

Virtual reality provides the subject with an illusion of being present in a simulated world. It allows the user to change the virtual world actively, because it is providing him/her with control over a false reality.

Virtual reality as a tool

"Design is the projection of something that is not there." (Anders, 49) A proposed building only exists in the architect's mind and it is only after it is represented that it exists in the physical world. (Anders, 49) Virtual reality is the ideal platform today; not only for the practice of architecture but also for its education. I want to be able to take advantage of virtual reality as a tool for the practice of architecture and at the same time, be able to transmit this knowledge to architecture students.

As a 'Tool,' we can create a virtual environment with the sole purpose of simulation. These simulations can help us test theories as well as concepts, helping us to visualize them in an effective and photorealistic way. In virtual reality, users can be introduced to an atmosphere of visual, aural, and tactile feedback that makes this space feel real, and allows the body to move as if it were in the physical space.

Cyberspace could be used to create new means for the three-dimensional experience. Let us remember that the architect doesn't have any difficulty visualizing three-dimensional buildings of the two-dimensional representations of plans, sections and elevations, but many times has difficulty helping the client visualize it. The multimedia applications facilitate the architect's task to achieve this, since they allow the architect and the client to work jointly in this environment. They can visualize the building together during the design process. This way, the client has an active role in the design, since he is able to see clearly the consequences of the decisions, and the architect is able to transmit his ideas in an effectively.

Virtual reality is an important tool in the design of virtual spaces, and at the same time, it is a great utility to design physical spaces. The power to experience the space before it is built allows us to locate design flaws, to corroborate theories, and to understand how the space will appear after it is built.

Lev Manovich proposes that in order for both spaces to be continuous, the scale of the representation should be the same as the scale of the physical space. This, in fact, is "the tradition of the simulation and not that of the representation." (Manovich, 112) "The tradition of the simulation spreads to combine the virtual and physical spaces; not to separate them." Both spaces have the same scale and their limits are not emphasized therefore the spectator is free of moving around the physical space. For this reason the "spectator exists in one, same coherent space; the physical space and the virtual space that continues it." (Manovich 112) The benefit of considering the virtual space only as a design tool is that the user is aware of its condition and knows the limitations that he/she might encounter. The accuracy of a simulation can be more forgiven because the space being generated is intended to represent and not to generate. However, as Manovich states, "'realism' is the concept that inevitably accompanies the development and assimilation of three-dimensional graphics: the ability to simulate any object in such a way that its image generated by the computer is almost indistinguishable from a photograph. Achieving photo-realism is the primordial goal in the field of the graphics generated by a computer." (Manovich, 184) Manovich believes that once we came to accept the photographic image as reality, the way to its future simulation was open. (Manovich, 200)

The Virtual House

The *Virtual House* is an elaborate computer model with photorealistic presence. It is the representation of the design of a house. This house is virtual because it exists in cyberspace. The materials used to construct it are pixels and voxels [1] (Benedikt, 155), and its means of representation are constant but yet have variables that allow modifications in real time. Th modifications however, have been planned and programmed in advance and only these specific modifications are allowed.

In the *Virtual House Project* [2], we are using cyberspace to explore a house that hasn't been built yet. The components of the building (walls, doors, windows, etc.) are located in a conventional way; exactly like we would expect the physical buildings to be seen. We understand this point of view thanks to our shared convictions on the buildings -- a room without exits would seem strange to most of the observers.

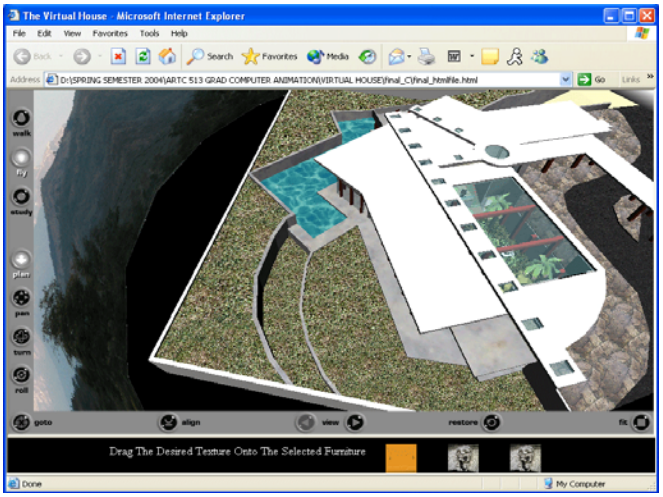


Fig.1 Screen capture of the Virtual House viewed with the Cortona browser.

This type of architecture is intended for "real use." The work carried out here is a reflection of that proposed for the real world. This "real scale" model is a design

platform that can be launched to assist during the design process and to help transmit ideas to a client in a very efficient way. At the same time the impression is given to the clients that they are actively contributing to the design of the house they are commissioning. The fact that there are some variables programmed into the design will give the clients the impression that they are in fact the ones making the alterations to the design, even though they will only be choosing from a small selection of possibilities already preconceived, and thanks to the means of representation, subtly insinuated.

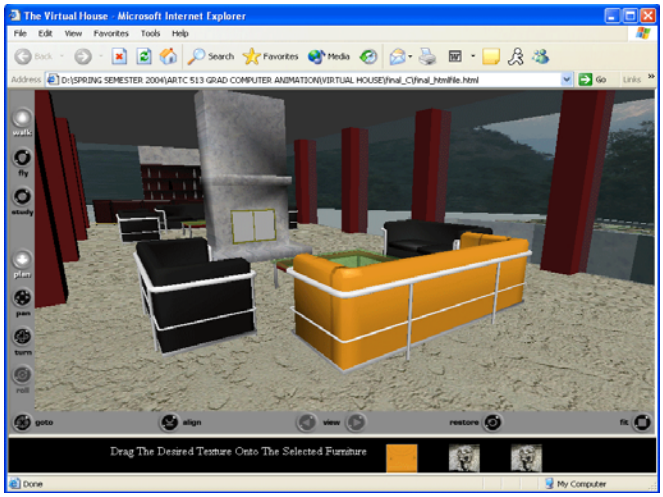
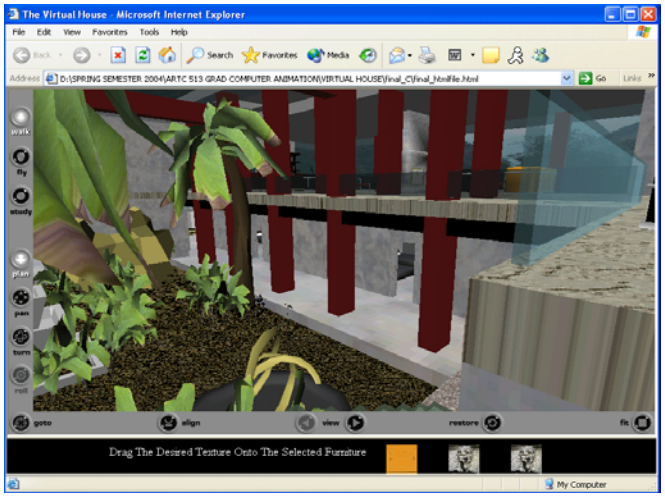


Fig. 2 Interior of the Virtual House. The texture can be modified in real time by dragging the selected texture onto the object.



Figs. 3-4 Interior views of the house

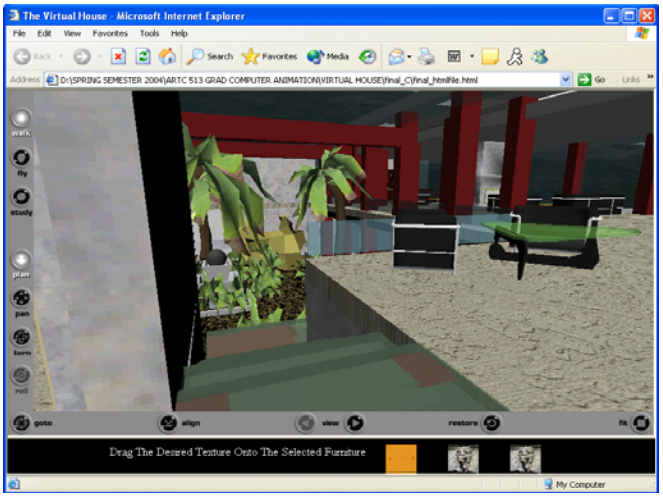
Virtual reality as a space

This type of architecture that I am envisioning in cyberspace is more than a simulation and certainly it's more than a representation. It is the "real thing" of a digital world. It is a type of architecture generated in cyberspace (in the space generated in a computer by a computer) to exist exclusively in cyberspace. Marcos Novak believes that "cyberspace itself is architecture but it also contains architecture" (Novak, 249) but that "the relationship between architecture and cyberspace so far is not yet complete." (Novak, 250) Inspired by Novak's "Liquid Architecture" [3], I seek to find that relationship and to be able to develop this architecture form which is not intended for the real environment; it doesn't present physical characteristics and it is not limited by factors like gravity, structures, materials, etc. However I believe that architecture in the cyber spatial environment can't be, in any way, substitution for architecture in a real environment and needs to be recognized as a type with self rights.

Cyberspace exhorts and motivates the utopian architect to design spaces in the real world; spaces of great cybernetic influence, that is to say, spaces not only affected in appearance, but also in function by the ideas developed in cyberspace.

Such ideas consist of new concepts of form and structure that will affect the way in which these spaces are directly designed. The experimentation in the virtual environment will make it possible to train the way of thinking and of analyzing of the architect, achieving in this way the transmission of cybernetic utopias to the design and creation of real spaces; an actualization [4] of the virtual thing.

This new type of architecture will have great a potential for actualization. Without any doubt, the architecture of the "physical" will be influenced by the architecture of the "virtual." This new type of visionary architecture will continue to stress the limits of what is possible encouraging the achievement of what is thought to be impossible.



As a space, we can envision virtual worlds as an extra dimension and not only as an alternative to the real world or a substitution of it. This allows us a new freedom of movement in the natural world; the transcendence of the physical "being" to the virtual world allows us to expand our way of operating in the physical world. We basically have the possibility to exist simultaneously in the physical world as in the virtual world.

The virtual world can be a space that resembles the physical reality in some aspects and simultaneously defies it in others, or it can be a world that has no resemblance to the real world and presents us with abstract forms and aspects that are not reconfiguring the physical world but creating a completely different one.

Here, virtual reality is not just a tool but the media itself. You need it to experiment the space, but more important, you need it to bring it to life.

However, while designing these spaces we need to take into consideration that there is no presence of sensorial experience in the world itself but it only exists through the existence of the own body living now and here. We should assume then, that Telepresence is possible only when separating the body and the mind; sending the mind to a virtual environment while the body stays in the real environment. We can send our mind miles away, but hopelessly our body should remain in the same place.

On the other hand, "Telepresence not only allows the user to control the simulation but reality itself" which means basically that "Telepresence allows us to remotely control the physical reality in real time, through its image. The body of the Teleoperator is transmitted, in real time, to another place, where it can act on behalf of the user. The essence of the Telepresence then is, the anti-presence, the Teleaction: to act at distance in real time." (Manovich, 166)

The evolution of cyberspace marks the creation of a world that is not separate, but displaced from the physical world.

The evolution of cyberspace marks the creation of a world that is not separate, but displaced from the physical world. If both worlds were separate from each other, the actions in the physical world would not directly affect the actions in the virtual world, but this is not the case. What happens in the real environment has a direct effect in the virtual environment. A causal connection does not only exist between the cyberspace and the physical space, but rather events in the real space usually determine the events in the cyberspace.

"Instead of building real buildings in this environment, the architects will build three-dimensional worlds to which everyone can have access through teams of virtual reality. Instead of creating utopian physical spaces, the progressive architects will design virtual spaces. The imagination of utopian architecture is not limited anymore by the physical reality."

These atmospheres will not only be dedicated to elaborate electronic games, but to a new form of architectural space where, little by little, daily activities (work, recreation, trading, and education) that nowadays are carried out in the real environment will begin to be carried out in this virtual environment. The architecture in cyberspace in no way can substitute the architecture in the real environment, but it will be a new manifestation.

It is contradictory to think that physical spaces will be strictly functional, because we are constantly trying to develop all the technological means to materialize the most daring and innovative designs, created in virtual space where inhibitions of form and essence are not admitted and function is no longer a concern. These designs will be characterized to possess a great potential of actualization. By interacting with this environment, a desire to transform the abstract thing into something concrete that is imagined as something palpable starts to grow. This necessity not only gives form to our perception and communication in our physical atmosphere, but also to our experience and ideas. If we begin to interact in a "fantastic" space, in dynamic and changing ways in the virtual level, our tendency will be of making the intent of transferring this type of environment to the real world. Our imagination will be fed of forms and spaces so varied and complex that in the physical atmosphere, our longings of novelty won't be satisfied until being able to create an atmosphere of virtual characteristic. When virtual reality started, the tendency was to imitate and simulate the "real" in the "virtual" space. I very much believe that soon the tendency will be to try to imitate and simulate (actualize) the "virtual" in the "real" space.

Conclusions

Many contemporary architects have already accepted the notion that architecture is affected by the user. They have paid attention to the acts of the users and they have witnessed how their design is modified by their activities. These modifications represent an essential part of the architecture, specially the architecture of cyberspace.

"It is clear that our ability to imagine architecture leads to our ability to build it. In the most advanced disciplines, the ability to build marks the difference between the application and the pure investigation, and the value of the same one cannot be discussed." (Novak, 248) When it comes to architecture in cyberspace, there is no need to build in the physical world what already has been built in the virtual in order to make it "real." It is already real in the virtual world, and from my point of view has as much value as a counterpart built in the physical world. In most cases, the virtual architecture is purer in theory and ideals than the

physical one. "Cyberspace can be seen as a vast virtual laboratory for the continuous production of new architectural visions." (Novak, 248)

One of the biggest challenges the architect will have to face will be whether or not to accept the limited applications of the variety of programs for the creation of virtual worlds. He/she should also wonder if cyberspace should be an exact replica of the real world or if this is an ideal opportunity to create something new.

Footnotes

[1] Three-dimensional pixel. (Volume pixel)
[2] This project was developed at Bowling Green State University, OH, by Brad Cress, Chris Beal, Dan Brainard, Jess Reeves and myself, for Greg Little's "Virtual Enviroments" class and as part of my research and experimentation for my MFA graduating project. Fall 2004. It was developed with Maya 5, VRML, Java scripting and its viewed with a Cortona web browser.
[3] "Liquid architecture is more than kinetic architecture, robotic architecture, an architecture of fixed parts and variable links... Liquid architecture is an architecture whose form is contingent on the interests of the beholder …" (*Novak, 250*) "A liquid architecture is an architecture that is not longer satisfied with only one space and forms and light and all the aspects of the real world. It is an architecture of fluctuating relations between abstract elements." (*Novak, 251*)
[4] To actualize the virtual consist in capturing and showing an instant of the change process that the object suffers in cyberspace.

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