

# **“Digitally Enhanced Spaces”**

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## **SCOPE OF THE PAPER**

In this paper I try and specifically look at Digital Art and Design practices that extend out of the screen into the physical 3-dimensional spaces. It will be searching for a spatial experience enhanced by employing digital media. It will look at practices involving architecture, interiors and installations to carve out different methods and approaches applicable to spaces and not differentiate among them. Anyhow, I will not be looking at various automated systems, surveillance/security contraptions, climate control and other electronically controlled technologies, which are installed in spaces that we dwell in.

## **1.0 BACKGROUND**

We are now experiencing a transition from the industrial society to the society of information. The digital technologies are the prerequisites for the current transformation from a society based on the production of goods to a society characterized by information processing and communication. One emerging consequence regards the way we will use our spaces in the future. Further, digital technologies are assumed to support new processes, thereby overcoming the traditional organization of certain spaces.

### **1.1 Space**

Space is the extent within which matter is physically extended and objects and events have positions relative to one another.<sup>[1]</sup> Physical space is often conceived in three linear dimensions, although modern physicists usually consider it with time, to be part of the boundless four-dimensional continuum known as space-time. The

model of space that we will consider for our study will restrict itself to the (physical) Cartesian space with time.

## **1.2 Digital Space**

Although there is no formal description or definition of a “digital space”, a “digital space” according to me is an environment created on mediums using computer screens, monitors, projections, displays etc. along with audio devices to generate a graphic visualization or contents that can virtually be experienced. These virtual worlds have the potential to immerse its viewer in the imagery and transporting him in those spaces, which can either, be on a 2-D or 3-D layout.

The term “Cyberspace” also emerges in this context. The term is rooted in the science of cybernetics and Norbert Wiener’s pioneering work in electronic communication and control science. Through its electro-magnetic nature, cyberspace integrates a number of capabilities (sensors, signals, connections, transmissions, processors, controllers) and generates a virtual interactive experience accessed for the purpose of communication and control regardless of a geographic location. In pragmatic terms, Cyberspace allows the interdependent network of information technology infrastructures (ITI), telecommunications networks--such as the Internet, computer systems, integrated sensors, system control networks and embedded processors and controllers common to global control and communications.<sup>[2]</sup> As a social experience, individuals can interact, exchange ideas, share information, provide social support, conduct business, direct actions, create artistic media, play simulation games, engage in political discussion, etc. The term was originally coined in the cyber-punk genre of science fiction author, William Gibson. The now ubiquitous term has become a conventional means to describe anything associated with computers, information technology, the Internet and the diverse Internet culture. With the help of telecommunication and the Internet these spaces have acquired a property of hyperspace, i.e. they have the capability of superseding time and distance. Game designers also exploit this property where they construct models within the machine to give a sense of absolute speed to its user.

## **2.0 DIGITAL + SPACE (D+S)**

An environment, which emerges out of fusing digital technologies and physical space, creates a D+S. These possibilities are now being explored by many architects, designers and artists in order to achieve new and emergent experiences, illusions, optimization, behaviors, interaction and relationships. The conditions born out of superimposing virtual and real, employing sensors/video/audio etc. for action-reaction, morphogenetic structures, kinetic and automated/robotic bodies, and locative media can completely change the perception of space itself. Where it begins, where it ends, when does it stop, how multipurpose can it be are all the equations that one starts probing into.

### **2.1 Methodologies**

Now I will briefly discuss a few methodologies mentioned above and later discuss examples in contexts that they were created in. Due to the diverse character of digital media and its manifestations in different industries, artists and designers take cues from either one or combine a few in their own practice.

#### **Computer Graphics**

It is a sub-field of computer science which studies methods for digitally synthesizing and manipulating visual content. The term refers to the study of three-dimensional computer graphics, two-dimensional graphics and image processing. Hence geometry, animations, renderings and special effects in film and television are sub-fields of computer Graphics. So many digital art and design practitioners take advantage of hardware like laser projections, HD projections, large screens and sometimes even print to juxtapose these visualizations and computer graphics on spaces, facades and architecture and landscape to transform them into dynamic environments. Though this approach has one disadvantage, since a lot of times this is screen based, they either need darkness of an interior space or they work at night.

#### **Wearable Computers**

Wearable computers are computers that are worn on the body. They have been applied to areas such as behavioral modeling, health monitoring systems, information technologies and media development. Wearable computers are especially useful for applications that require computational support while the user's hands, voice, eyes or attention are actively engaged with the physical environment. One of the main features of a wearable computer is consistency, there is a constant interaction between the computer and user. Although there are many areas of study within this, we will look at augmented reality and virtual reality and custom systems which efficiently use a space for navigation and generate experiences.

Virtual reality (VR) is a technology which allows a user to interact with a computer-simulated environment, be it a real or imagined one. Most current virtual reality environments are primarily visual experiences, displayed either on a computer screen or through special or stereoscopic displays, but some simulations include additional sensory information, such as sound through speakers or headphones. Some advanced, haptic systems now include tactile information, generally known as force feedback, in medical and gaming applications. In the book *The Metaphysics of Virtual Reality*, Michael Heim identifies seven different concepts of Virtual Reality: simulation, interaction, artificiality, immersion, telepresence, full-body immersion, and network communication. The definition still has a certain futuristic romanticism attached. People often identify VR with Head Mounted Displays and Data Suits. The problem with VR is that it still works on the principle of creating an illusion and does not really use space to negotiate information. This is interesting because a user can travel through different worlds while he could be stationed in the mundane white cubical.

Augmented reality (AR) is a field of computer research which deals with the combination of real-world and computer-generated data (virtual reality), where computer graphics objects are blended into real footage in real time. At present, most AR research is concerned with the use of live video imagery which is digitally

processed and "augmented" by the addition of computer-generated graphics. Ronald Azuma's definition of AR is one of the more focused descriptions. Azuma defines an augmented reality system as one that

- \* combines real and virtual,
- \* is interactive in real-time,
- \* is registered in three dimensions.

AR proves to be more conducive to D+S as one does not lose sense of the physical space that he exists in.

### **Sensors**

A sensor is a device that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. The world of sensors is so wide that it provides a huge range of work employed. We know that there are mechanical, force, chemical, biological, electrical, thermal, acoustic, photo/light and electromagnetic sensors which are amongst the prime sensors used by artists and designers. Highly interactive and responsive work can be generated using these technologies. Act-React works can achieve sensitivity that resonates with the space and help us understand our movement through space by making us understand various hidden forces acting upon us.

### **Audio and Video**

We are already aware of the potential of this media. Audio concerns itself with the sound and acoustics recording, playing and manipulating it, strategic placement of input and output devices often alter the notion of space itself. Video is the technology of electronically capturing, recording, processing, storing, transmitting, and reconstructing a sequence of still images representing scenes in motion. Various experiences can be simulated by virtue of these technologies and transforming the character of a space completely.

### **Locative and Mobile Media**

Mobile computing is a generic term describing one's ability to use technology while moving, as opposed to portable computers, which are only practical for use while

deployed in a stationary configuration. Locative media are media of communication bound to a location. They are digital media applied to real places and thus triggering real social interactions. While mobile technologies such as the Global Positioning System (GPS), laptop computers and mobile phones enable locative media.

"Locative media is many things: A new site for old discussions about the relationship of consciousness to place and other people. A framework within which to actively engage with, critique, and shape a rapid set of technological developments. A context within which to explore new and old models of communication, community and exchange. A name for the ambiguous shape of a rapidly deploying surveillance and control infrastructure."<sup>[3]</sup>

Teri Rueb's Core Sample employs these mediums beautifully and transforms the topography of the site into a historically layered patch of earth. It particularly deals with landscape and open spaces which help the viewer to understand the content lost in time and not visible due to inevitable processes. This kind of tagging the space causes more realization to the person than transformation. This lost audio and naturally visual data base breaks the barrier of time effectively and virtually relive the past of the geography.

## **Bio**

A lot of buzz is created around this word although no substantial work has been produced to achieve a biologically generated D+S. Bio-mimetic, bio-genetics, bio-metrics etc. have found some application in the physical world but is still under germination. I mention this subject because I think it has a lot of potential and can add another dimension of life in our spaces. Emergent technologies like nano-tech are also proving to be important in the Digital field.

Below is some work classified in different categories and fields.

## **2.3 Installations**

Installation art uses sculptural materials and other media to modify the way a particular space is experienced. It is not necessarily confined to gallery spaces and can be any material intervention in everyday public or private spaces. We will look

at installations that specifically employ digital media. Most Installations in this genre tend to be interactive.

The use of space and every day elements by Antenna Design in their installations is worth studying. (visit installations at [www.antennadesign.com](http://www.antennadesign.com)) Nosy Parker is an interactive installation which was installed at Balance and Power Exhibition, Krannert Art museum, Urbana-Champaign, 2005. Stools are instated in the exhibition space so that viewers can sit and take rest and enjoy the exhibition around them. But once they sit the camera embedded in the stool pointing upwards starts taking pictures of the person and starts distributing it to other visitors sitting on the stools. When this is triggered the visitor previously engaged in some other activity gets involved in the piece and assumes a role of the performer. The stool itself transform itself from a sitting device to a social exchange stimuli. This exchange of involuntary information treads on the line of being surveilled but the visitor enjoys the dynamic transformation from being in the exhibition to the exhibit himself.

Cherry Blossom at Design Triennial, Cooper-Hewitt, National Design Museum, 2003 by Antenna Design is also an interactive Installation. It is situated in the center of the grand staircase, and through surveillance cameras it monitors the traffic. When someone walks on the stairs, each step trigger the projection of a ring of swirling cherry blossoms, relative to that step, accompanied by a sound effect. The busier the stairs get the more dynamic the cylinder of projections get. Besides the art concept the installation establishes a new relationship of the visitor with the stairs and the cylinder which accentuates the quality of linear space in the museum. The visitor understand the relationship between each step he makes and consequential visualization and sound trigger. This intervention is particularly interesting because it changes the staircase in a large piano where each step is a key.

Power Flower is an interactive public installation also by Antenna Design, but this one uses just light and sound. A series of neon flowers that “bloom” when passerby

trigger motion sensors that create an ongoing process of blossoming light sculptures and ambient sound events. A street is a dynamic space in itself, by adding a layer of light and sound a pattern of rhythm starts emerging from the traffic flow. This installation virtually bring the passerby on the façade and creates a kind of rubbing or scanning effect to that zone. People cross each other several times on the street but in this case a heightened awareness causes a conscious interception between people crossing each other. Interestingly people in their tune of walking keep walking at the same pace but experience a change in environment for the time they are crossing it.

#### **2.4 Augmented and Virtual Reality (AR) (VR)**

Sensorama was a machine that is one of the earliest known examples of immersive, multi-sensory (now known as multimodal) technology. Various iterations of cyclorama were also effective in blurring the boundaries between the virtual and the real. Now there are interfaces like immersa-desk and CAVE which are used in placing a virtual object in the physical space. A Cave Automatic Virtual Environment (better known by the recursive acronym CAVE) is an immersive virtual reality environment where projectors are directed to three, four, five or six of the walls of a room-sized cube coupled with surround sound and wearable media. Work of Jeffrey Shaw, Myron Krueger, Charlotte Davies and Jenny Holzer are very important this context. For example, Legible City, by Jeffrey Shaw combines a physical reaction into a virtual experience. How to navigate through spaces and notion of conventional spaces and matter is completely disregarded here. This adds a new perspective to dimensionality.

Michael Mateas AR-Façade creates a rich environment where the set of the game is re-created and the game unfolds in the real space. The relationships here with the user and the virtual character creates another set of relationship with the space. How fictional characters circulate in the space and the narration of the story revolves around you, suggests an immersive nature which is physical and mental. This passes the threshold of immersion restricted within mental spaces through

screen based video games, graphics and animations. I can imagine a sophisticated version where a museum like space can employ these technologies to mediate information to the viewer and become a part of the entire architecture (like a virtual guide).

## **2.5 Digital Architecture**

Many efforts are made by architects to integrate digital technology in their design. Many artists have also used architectural facades , buildings and monuments as a canvas to project imagery and communicate new meanings derived by them. Some early attempts like Jean Nouvel's, The Institut du Monde Arabe (IMA) or Arab World Institute (AWI) ([http://en.wikipedia.org/wiki/Arab\\_World\\_Institute](http://en.wikipedia.org/wiki/Arab_World_Institute)) in Paris used the façade of the building as an entity, which reacts to light and dilates. This kind of a skin established a new relationship between the inside and the outside. Recently another project called GreenPix- The Zero Energy Media Wall by Simone Giostra & Partners and Arup used the entire façade of the building as a large LED display. This notion of architectural surfaces as digital media creates new relationship between architectural aesthetics and digital aesthetics. This gives the building to communicate other messages which links digital, material and form. (<http://www.greenpix.org/download.php?mode=0>) . Now moving away from the skin works of architects Kas Oosterhuis and NOX comes to light. In Water worlds - design and construction of an exhibition pavilion in Neeltje Jans, the Netherlands. ([http://synworld.t0.or.at/level3/text\\_archive/testing\\_ground.htm](http://synworld.t0.or.at/level3/text_archive/testing_ground.htm)) (<http://www.oosterhuis.nl/quickstart/index.php?id=116>) these spaces use complex sound, light and projection techniques to immerse the viewer completely in the aquatic world. These directions where a viewer can get a glimpse of a world that exists but is not accessible transforms a space from an empty space to an alien world questions the tactiles related to physical space itself.

## **2.6 Digital Interiors**

Designers are working hard to manipulate spaces to spaces of fantasies. Design approaches include metamorphic attitudes where an element like partition in the interior could respond to your presence and change the its notion from static to

kinetic. Under this, the work of architects demonstrates how spaces around us turn fluid. (<http://www.narchitects.com/frameset-party%20wall.htm>) Party wall is an interactive installation at the SoHo gallery Artists Space, created a variable boundary in the gallery, dividing visitors into different sides of the room. Party Wall allowed "neighbors" to dynamically modulate the thermal, acoustic and spatial qualities of a simple screen made with 2" thick bands of foam.

Finally I would like to discuss the work of MESO. MESO was founded in 1997 by four designers and a computer scientist which shared a strong passion for projects transcending their own discipline. They specifically do work under the heading of digital interiors and have designed a large spectrum of projects (<http://meso.net/DIProjects>) There project called Project: On Things Of(f) Things On is using digitally controlled lighting to accentuate certain interior elements and carve out the waving space. Project: Salzzeitreise (<http://meso.net/Salzzeitreise>) Berchtesgaden is one of my favorite examples, it is a museum deep inside a salt mine in southern Germany. Especially there Salt Cathedral (<http://meso.net/SalzzeitreiseRutschentracking>) which tracks the visitor on the floor of the underground lake. The overall lighting, sound and digital design propels the human experience and diverges his thoughts from being under the earth's belly to an indescribable environment. Project: Cocoon Club realtime 360° visuals (<http://meso.net/cocoon-membrane>) is an important example since it exists within the socio-cultural context. This lifestyle enhancing venue successfully creates a psychedelic mood amongst the club goers. Real time animations are projects through out the space according to the pace of the music and motion. Under the influence of alcohol I can imagine the surreal imagery the viewer would experience and immerse himself in the tripping environment.

### **3.0 CONCLUSION**

I have realized that these approaches are extensions of mental spaces that are commonly shared by a large mass of people. That means what was personal can

now become public. Also the de-materialization of spaces caused by the overlap of digital media can be problematic. Ultimately knowledge of what exists is very crucial to maintain sanity and equilibrium between man and space. With these powers comes great responsibility. We have to be cautious about what gets mediated and what is left unmediated. As an experience I can say it also has the potential to get closer to the spiritual experience and resolve mystery between the physical and the metaphysical.

**Reference:**

1. Britannica Online Encyclopedia: Space
2. Wikipedia: cyberspace
3. Russell, Ben (2004). "TCM Online Reader Introduction". Transcultural Mapping Online Reader. Locative Media Lab. Archived from the original on 2006-07-20. Retrieved on 2005-11-13.