

# A Panoramic View on Visorama

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Abstract: In this paper we give an overview of the Visorama Platform. We discuss the technical aspects of the hardware and software platform, as well as, the projects and installations developed with the system

## 1. The Visorama

Visorama is an original and complete enlarged reality and multimedia system, with dedicated hardware and software, aimed at the following fields: digital art, entertainment, historical tourism and education. Visorama has been under development since 1997, coordinated by Andre Parente and Luiz Velho. Visorama is a joint-venture of the N-Imagem Group from the Federal University of Rio de Janeiro and the Visgraf Laboratory from IMPA, sponsored by the following research support bodies: CNPq, FINEP, FUJB, and FAPERJ. On the hardware level, Visorama simulates a binocular or a telescope, allowing the user to employ it as if he or she were looking through the eyepiece of traditional optical devices to observe the scenery or the surrounding space. On the *software* level, it *uses* new visualisation techniques and a multiresolution *image-based rendering* algorithm. The Visorama may be defined as a cybernetic observatory which allows the observer to travel through space and time, led by his or her interest in a kind of virtual visit to the space observed.

## 2. Technical Features

**VISORAMA HARDWARE:** The hardware is composed of a viewing device, an interface unit and a multimedia computer.

### Viewing Device

- Display: Virtual Binoculars SVGA, 60 Hz, with focus and interocular distance adjustments and zoom and mouse compatible controls;
- Audio: Bose speakers / Headphones;
- Support Base: Pan and Tilt mechanism with viscosity and range adjustment.
- Control: Buttons for Zoom, Selection, Mode and Volume;

### Interface Control Unit

Acquisition circuit for angle encoders and buttons. Uses RS-232 Serial Protocol.

### Multimedia Computer

- Windows XP, dual processor Pentium, 768 Mb RAM, N-Vidia Ge Force Go 5200 64 MB, 80GB HD,

**VISORAMA SOFTWARE:** The software comprises a Virtual Reality presentation engine and an Authoring Environment.

### **VR Presentation Engine**

- Visualization Module: Uses polygonal panoramic surfaces with multiresolution m tiled texture mapping.
- Sound Generation Module: Performs MIDI and speech synthesis.
- Navigation Module: Implements finite-state control for spatial / temporal transitions of audio and visuals.

### **Authoring Environment**

- Panorama Assembler: Constructs image mosaics using rotation transforms. Does color equalization and correction.
- Script Editor: Event-based language for creating scene navigation paths.

## **3. Installations**

Visorama has been publicly shown and demonstrated in congresses, workshops, shows and international exhibitions at research centres and major museums, among which we highlight two public installations. One during the *2<sup>a</sup> Mostra Internacional de Realidade Virtual – 2<sup>nd</sup> International Virtual Reality Show* (Universidade Cândido Mendes, 1999), when it was elected the most interesting system by the visitors. And during the exhibition *Paisagem Carioca* (Museum of Modern Art, Rio de Janeiro, 2000), there were long queues to see it on the weekends.

## **4. Projects**

### **4.1 Visorama-NBP**

Visorama is a hypertextual commutation centre containing images and sounds allowing the observer to navigate through the space and time of a real landscape, whatever it may be, as if he had a dynamic cartography system available. In the Visorama-NBP Project we intend to set up an immersive and interactive installation in which the Visorama is used to interact with the work of visual artist Ricardo Basbaum, who conducts the NBP (New Bases for Personality) project. The Visorama-NBP installation is comprised of elements which establish direct connection with the spectator, turning him/her into a vehicle and support for art game and play. The spectator's presence activates the mechanisms of the work, establishing real-time interaction that puts the two pieces together, thereby creating many interactive connections, which allow the audience to take part into the experience.

## 4.2 Rear Window

Visorama integrates a group of contemporary mechanisms, half-way between audiovisual, art and interactive interfaces. In fact, in these last few years, we have watched the coming of a series of panoramic installations, contemporary to Visorama, whose mechanisms are also, in their own individual ways, a variation of the convergence of contemporary art, advanced technologies and cinema as new media. To make art converge in another way, with audio-visual and narrative interfaces, we radically transform the narrative possibilities of cinema. In the Rear Window Project, we intend to use Visorama to reinvent the cinematographic experience of Hitchcock's film. The space of the Rear Window installation simulates the *loft* in the film by the same name. The idea is to force the interaction between the loft's real window and Visorama's virtual window. When the spectator manipulates the device, he will produce certain events on the windows observed on buildings in sight. He can decide whether he wants to get closer to this or that window and, when he does so, he will induce events. Certain events will transform the physical conditions of the loft where he is, mainly the lights, sounds, images on the television and the operation of certain devices such as the stereo and the clock. Everything is done so that the events triggered by the spectator surprise him, like in the movie.

## 4.3 Figures in the Landscape

This comprises an interactive audiovisual installation in which the spectator, using the Visorama, interacts with images which tell the story of the landscape. Upon interacting with an urban scene (first navigation level), the spectator perceives, little by little, that he is before a mosaic image which hides hundreds of other images containing other levels of navigation. The landscape and faces seen comprise part of the story of the characters which inhabit the scene initially displayed. The installation mixes scenes and faces, images and sounds, fixed and moving images, leading the spectator into exploiting the images to find his own place in the landscape. By manipulating the Visorama, the spectator displaces himself "inside" the projected image, exploiting it in its tiniest details. As from a 30x zoom, the spectator starts to perceive that the initial image is made up of small natural landscape images, which comprise another level of navigation. It is important to notice that the image keeps its resolution throughout the zoom selected whatever the navigation level. Upon penetrating one of these landscapes, the spectator becomes aware that the same process repeats itself, that is, it comprises a mosaic image with two depth levels in the former, the urban image is comprised of images with "natural" scenery, in the latter, the "natural" scenery is made up of faces. These faces display movement and talk about landscapes. The spectator perceives that these comments, which mingle with the sound of the landscapes previously-seen (1<sup>st</sup> and 2<sup>nd</sup> level of navigation), are nothing more than the impression of the feelings of these persons into the landscapes which they lived in or imagined.

#### 4.4 Visorama-Lumière

An interactive installation project in which Visorama is used for interacting with 360-degree panoramic photographs created between 1900 and 1904 by the Lumière Brothers with their *Périphote* camera. The panoramic photographs – in the cellulose nitrate format (87 x 628 mm) - are found in the C.N.C Archives. They had been made to be presented on Photorama, a system allowing for the projection of these panoramic pictures in a 20-meter diameter rotunda with an 8-meter high screen on the entire periphery. The goal of this project is remaking photographs of the places represented by the Lumière sights in order to allow the user to observe the transformations occurring to the landscapes represented, as well as to travel in space and time by way of Visorama. The user will interact with the photos of the past and present as if they were a virtual environment. The software component comprises a visualization system with a high-level language, allowing for the design of transition between the images and a microresolution microchip so as to preserve the same image definition resolution during the zoom. These two characteristics of the visualization system allow for an immersion and greater interactivity of the environment represented through the photographs.

#### 4.4 Cybernetic Observatory

The Visorama may be featured also as a virtual museum for the creation of dynamic and interactive information spaces, a virtual window which allows us to visualize perceptive adventure in space and time. In order to understand the Visorama better, we shall analyze three examples of some changes currently taking place with the educational action of cultural centers, through the emergence of new communication technologies. The Visorama brings together, all at one time, these three features of the new museums as information spaces, by enlarging their spaces and actions, rendering their collection and experiences dynamic, and, above all, by extending their networks.

### 5. Research

The *Visorama* distinguishes itself from the other systems on three levels of development: the *software* level, the *hardware* level and on the level of its applications. On the **software** level, The Visorama project includes the research of new graphic techniques for panoramic images with a new methodology to build and visualize a stereoscope panorama; a high level language to provide transition mechanism between panoramas (wipes, blending, etc.); a multiple resolution panoramas to assure the image's resolution level; a new use of sound in the panoramas' exhibition. As part of the Visorama System, we developed a **hardware** device that uses a binocular display to show the image generated by the panorama system. This display is attached to a support base that can rotate around vertical and horizontal axis, which have high-resolution sensors (5000

positions) that together capture the current viewing orientation. In addition, three buttons allow the control of zoom angle and the generation of discrete events. The sensors and buttons are sampled and their values are sent to the multimedia platform, where the output image is generated by the system's software accordingly. This form of direct manipulation of the viewing parameters provides a natural interface for virtual panoramas. On the level of its **applications**, the system as a whole is designed to promote a more natural interaction with the real space, since its basic characteristics allow the possibility of visualisation of the real through a virtual window. We are dealing then, with an enlarged or expanded reality system, that increments the observer's interaction with reality through the virtual. The observer's interaction with reality is related to two basic types of dislocation. The viewer travels in the space following the several link points contained in it, as various possible navigation routes. The viewer also travels in the time through waiting, once the relationship between images connected to the same point in space is rendered by time.

## 6. Publications

The Visorama Project generated the following publications.

### Papers

- *III Workshop Multimedia and Hypermedia System*. São Carlos, SP, Maio 1997.
- *Computer Graphics International'97*. Diebenpeek, Belgium, Junho, 1997.
- *IVa COMPÓS/97*. São Leopoldo, Rio Grande do Sul, Junho, 1997.
- *Fourth International Conference Hypertexts and Hypermedia: products, tools, methods*. Université Paris, França, Setembro, 1997.
- *Seminário Internacional Novos Paradigmas Narrativos: Dramaturgia e Interatividade*. Centro Cultural Dragão do Mar e *The Banff Centre for the Arts*, Fortaleza, Abril, 1997.
- *First Image Based Rendering Workshop*. Stanford University, Março 1998.
- *I Internacional Symposium of Art and Technology*. Instituto Cultural Itaú, São Paulo, Setembro-outubro, 1998.
- *2ª Mostra Petrobrás de Realidade Virtual*. Centro Cultural Cândido Mendes, Rio de Janeiro, junho, 1999.
- *Congresso Internacional, As Ciências da Comunicação na Viragem do Século*, Sopcom, Lisboa, 1999.
- XXII Congresso Brasileiro de Ciências da Comunicação - Dimensões socio-culturais do processo de informatização -, Rio de Janeiro, setembro de 1999.
- IV Congresso Ibero Americano de Gráfica Digital. Sigradi -PROURB, UFRJ, setembro de 2000.
- Seminário Internacional Psicologia e Projeto do Ambiente Construído. UFRJ, agosto de 2000.

## **Books**

Parente, André. *O virtual e o hipertextual*. Rio: Pazulin, 1999. 112 pgs.

Catalog of the Exhibit *A Paisagem Carioca*, Museu de Arte Moderna do Rio de Janeiro, september of 2000. 245 pgs.

## **Theses**

*Dispositivos imersivos: do panorama à realidade virtual*. Master dissertation by Luciana Ferreira de Almeida, november of 1999, ECO-UFRJ, supervised by André Parente.

*Visualização de panoramas virtuais*. Master dissertation by André Matos, july of 1998, departamento de informática, PUC-Rio, supervised by Luiz Velho (IMPA-CNPq).

## **CD-ROM:**

*O Sistema Visorama*, produced by Núcleo de Tecnologia da Imagem da Escola de Comunicação da UFRJ in partnership with the Laboratório VISGRAF do Instituto de Matemática Pura e Aplicada Lançado for the 2<sup>a</sup> Mostra Petrobrás de Realidade Virtual. Centro Cultural Cândido Mendes, Rio de Janeiro, june, 1999.

*A Paisagem Carioca*. CD-ROM from the exhibit *A Paisagem Carioca*, Museu de Arte Moderna do Rio de Janeiro, dezembro de 2000.

## **Vídeos:**

*Visorama: A System for Visualization of Panoramas*. Sibgrapi'98 Video Show, 1998. 4 min and 30 secs.

*Cache. Management for real time*. Sibgrapi'99, Video Show, 1999. 3 min. and 20 secs

## **Clips:**

**Printed Media:** Veja, Vejinha, O Globo, JB, Folha de São Paulo, O Dia, Veredas, O Povo, Diários and others.

**Electronic Media:** *Hipermídia* (GNT), *Globo Ciência* (Globo), *Descobrimentos* (TVE), *Sistemas de Realidade Virtual* (UTV).

## 7. Contact

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*André Parente is a Professor at Escola de Comunicação of Universidade Federal do Rio de Janeiro, since 1989. He got his PHD degree in Cinema in 1987 from Université Paris VIII, under direction of Gilles Deleuze. His works are constituted by experimental and conceptual pieces, including a wide variety of formats, such as installations, interactive work, single channel vídeos and short films. His research interests include digital and interactif cinema and new media. Actually, he coordinates N-Imagem (Núcleo de Tecnologia da Imagem - [www.eco.ufrj.br/n-imagem](http://www.eco.ufrj.br/n-imagem) ). His is the author of the following books: Yasujiro Ozu: o extraordinário cineasta do cotidiano (1990); Imagem-máquina. A era das tecnologias do virtual ( 1993); Sobre o cinema do simulacro (Pazulin, 1998), O virtual e o hipertextual (1999); Narrativa e modernidade, o cinema experimental, direto e disnarrativo (2000); Tramas da Rede (2004).*

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