ARTISTS' STATEMENTS

HIMALAYA'S HEAD: DISTURBED VISUAL FEEDBACK IN AN INTERACTIVE MULTI-USER INSTALLATION

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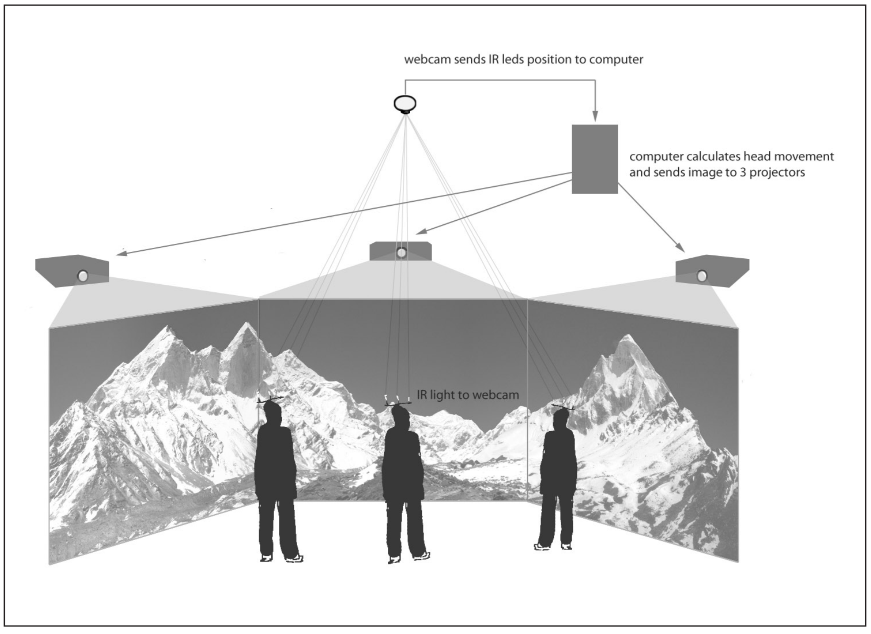
Himalaya's Head is a multi-user installation that explores the phenomenon of mismatches between images on the retina and head movements. Participants experience the sensation of things not happening at a normal pace due to the loss of the natural balance between their actions and retinal feedback.

The piece questions the way people interact with their environment. We perform hundreds of actions unconsciously. Normally as we move around, for instance, we are hardly aware of the retinal flow produced by head movements. Sometimes the experience of visual illusions that make us wonder about the way in which we perceive and process our environment can reveal the mechanisms of the brain. So we decided to blow up one such mechanism and distort it.

In *Himalaya's Head*, a 3D snowball connected via sensors to a participant's head movements moves more slowly and in a different way than the participant expects, giving him or her the feeling of moving his or her head through thick syrup. This sensation results from the damped forced harmonic algorithm controlling the movements of the snowball, and also because, as speed is relative, the reference speed is set by a moving landscape while the head remains still.

Fig. 1. Sarita Dev and Maurits Kelder, *Himalaya's Head*, multi-user installation, 2005. (© Sarita Dev) View of the installation setup.



THE HEAD-TRACKING SYSTEM

Participants wear lightweight, cardboard head beacons, each equipped with three infrared LEDs. A web cam positioned above the participants captures the movement of the LEDs, and a computer uses this information to calculate participants' head positions and to direct a 3D world and its dynamic 3D objects in real time. The result is projected on three adjoining screens (Fig. 1). The head-tracking system measures the horizontal and vertical rotation and position of up to 10 participants simultaneously. They can walk freely around the space, and the system keeps up with who is controlling which 3D object.

THIN AIR OR THICK AIR?

Each participant gets control over one snowball, which reacts to the participant's head movements, creating the sensation of floating through the landscape (Color Plate C No. 2). As all the snowballs are identical, the challenge is to find out which snowball is under whose control.

Playing with the snowballs and letting them move is a game in itself. The snowballs can float happily dreaming or chase each other in friendly or aggressive ways. The tranquil effect of the floating is disturbed when the participants are challenged to knock down a virtual mountain guide in an adrenaline-stimulating game, forcing them to choose between experiencing the hypnotic world or the gaming world.

The Genetic Creation of Bioluminescent Plants for Urban and Domestic Use

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Fig. 2. *Genetic Barcelona Project*, Barcelona, 2005. (© Alberto T. Estévez. Simulated illustration by Aleix Bieto and Gabriel Montañés.) Simulation of city street lit by lemon trees whose leaves emit natural light created by genetic treatment.

In 2000 the Universitat Internacional de Catalunya, Barcelona initiated a postgraduate research specialization called Genetic Architectures at its school of architecture, Escuela Técnica Superior de Arquitectura (ESARQ). I founded and currently direct the Genetic Architectures program and was also ESARQ's founder and first director. Our Genetic Architectures program applies two academic approaches: 1) scientific genetics (researching biologically useful plants, trees, etc.) and 2) understanding digital generation, production, visualization and fabrication as a genetic process involving computation and genetic algorithms in collaboration with science, bioethics and engineering for experimental architectural research.

Process

In the first phase of applying genetics to architecture we considered introducing luminous protein into the DNA of vegetation. Various natural bioluminescent color possibilities exist, as witnessed in fish, glowworms and algae or from certain jellyfish such as *Aequorea victoria* from the northwest Pacific Ocean. Since the 1962 discovery of green fluorescent protein (GFP) in *Aequorea*, hundreds of studies have developed in a snowballing effect. The GFP gene from *Aequorea* can be easily combined with the genes of other species, as Fernández Vaquero, a scientist at Castilla–La Mancha University, has noted: "In 1992 *Aequorea's* GFP cDNA sequence was determined, demonstrating that its hetrologic expression in non-jellyfish organisms produces fluorescence without any cofactors" [1]. With such properties, and its easy availability, *Aequorea's* GFP became the cellular marker most used in genetic research. Yet, while geneticists consider GFP a working tool, I see it as a fascinating potential component in the application of genetics to architecture.

Consequences

It is clear that world consumption of electricity must be radically reduced. For example, Barcelona, with a small area and very high density, spends 10 million euros annually just on the maintenance of its street lights (repairs, repainting, etc.), in addition to the actual consumption of electricity. Barcelona's scenario may be multiplied by cities globally, pointing out the critical need for alternative energies addressed by our research. I have no doubt bioluminescence will substitute for artificial lighting as part of a solution to these problems (Fig. 2).

Like much in conventional medical research, genetic research for architecture requires precautions with special emphasis on avoiding accidents and contaminations. We are setting strict procedures for testing in hermetic environments, breeding plants without pollen, while we investigate naturally occurring plant GFP in chloroplast in order to avoid pollination problems.

From the beginning this research has been conceived as architectural and urban. Today, our seven GFP lemon trees (and their implications) with living, luminescent leaves (published here for the first time) present infinite possibilities (Color Plate D). As we acknowledge the pioneering work of genetic artists such as Eduardo Kac [2], we may envision evolving science, architecture and design collaborations in which genetics becomes integral to architectural research and production.

References

1. A. Fernández Vaquero et al., "Análisis de la dinámica celular con proteínas fluorescentes" (Analysis of Cellular Dynamics with Fluorescent Proteins), Centro Regional de Investigaciones Biomédicas (CRIB) y Facultad de Medicina de Albacete, Universidad de Castilla–La Mancha, *Biojournal.net*, No. 1 (February 2005).

2. See Eduardo Kac, "Transgenic Art," *Leonardo Electronic Almanac* **6**, No. 11 (1998); Eduardo Kac, "*GFP Bunny*," *Leonardo* **36**, No. 2, 97–102 (2003).

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