

The Evolving Oblique: The Embodiment of a Virtual Topology

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ABSTRACT

The Evolving Oblique is an interactive video and sound installation that explores the spatialization of cinematic projection and the mediative role of the human body. Centered upon the theme of transformative nature, the installation re-contextualizes notions of landscape and architectural form into a new topology through the embodiment of the moving image.

Categories and Subject Descriptors

J.5 [Arts and Humanities]: Architecture, Fine Arts; I.3.7 [Computer Graphics]: Three- Dimensional Graphics and Realism- *Animation*; I.4.1 [Image Processing and Computer Vision]: Digitization and Image Capture

General Terms

Design, Experimentation

Keywords

Architecture, Interactive Installation, Topology

1. INTRODUCTION

The installation questions the relation between the viewing subject and their perceived environment, creating a bodily engagement with a dispersed and unfolding spatial field. The movement of the subject interactively modulates imagery and sound. Through interaction, the piece connects real and virtual movement and in so doing questions the relationships between the image and its projective physical surface and the body, therefore creating a conceptual construction whereby perception and action are combined. In the work architecture becomes a migrant, expanding the notion of place; space becomes fluid. The projected imagery deals with space as a medium, a substance through which events are interrelated by interference and amplification. The imagery is a way to inhabit time; virtual movement is connected to ones own movements, creating something far more sensitive and responsive than architecture of frames and solids.

2. VIRTUAL TOPOLOGY

The original inspiration of the project was a marginal territory of marshland. Constantly subject to dynamic tidal and wind forces this shifting landscape is perpetually in flux: an environment characterized by palimpsest, sedimentation and erosion. In the Evolving Oblique, architectural forms and metaphors of landscape combine to form a notional topology. Operating between field and fragment the virtual imagery produces an environment, integrating the horizon into the curved lines of a vortex to destabilize the perceptual space. Rather than giving the territory singular limits, which are characterized by traditional relationships between figure and ground, these limits are set into motion; they become blurred.

The imagery is composed of animations from 3D models. Tectonically, these animated forms are both skin and structure. Open to variations of transparency and porosity, these dynamic membranes enact reflexive relationships creating forms that oscillate between exposure and enclosure. These mobile forms inflect, rotate, extrude, mutate. The dynamic 3D forms are mapped with video textures from real landscape. The imagery operates somewhere between the virtual and the real, allowing for multiple interpretations. There is no singular route. Rather a territory is created that is intertwined with the movement of the viewer. There is not a specific one to one correlation of interaction, but a gradual understanding of how the body may relate to form, by progression through the landscape.

3. STRUCTURE

The installation is constructed of 6 semi transparent hung screens and 3 projectors situated at each edge projecting towards the centre. A small video camera is mounted in the ceiling in the central interactive zone. The installation is intended for a single user within the interactive zone. The triangular layout of the double screens is articulated to form an immersive environment. The edge of the imagery spills between screens blurring the boundaries between the projected image and its structure. The projected surfaces lose their coherence as objects. Through the juxtaposition of screen imagery, notions of scale, depth and orientation are in flux. The use of monochrome induces the black background to disappear and the light forms appear to float on, and between the screens. The dialogue between the screens creates forces of withdrawal and disclosure of the projected image, oscillating the perception of the installation space between an extension or three dimensionality of the image and marking

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surface tensions. The installation may be viewed within the central interactive zone and from the exterior, such that changes in viewpoint allow for different perceptions and compositions of the imagery.

4. IMAGE STRUCTURE

The imagery is composed from over 20 complex 3D models which have virtual cameras animated to form paths of movement transgressing through them. The viewer's movement relates to the movement within the models. The animations consist of 15 second video clips relating to each camera movement, combined to form a sequence through cross fading between each clip. For example a movement to the left will trigger a corresponding pan to the left. There are also a series of clips composed of different forms of horizons and cloud formations, which form open vistas compared with the enclosed nature of the complex forms. The 20 complex models are combined in a random sequence, such that the viewer will explore an evolving landscape. Through the viewers movement a unique spatial trajectory is enacted on the level of presentation through the real-time video processing.

5. INTERACTION DESIGN

The installation is an interactive environment that allows the participant to enact a form of choreography through a synthetic territory. Thus the interaction through the intuitive interface allows for a range of movement and dialogue with the environment. By moving in different directions or with different speeds, the experience of the landscape varies. Rather than concentrating on positions within space, it is the direction of movement that is key, in a specific period of time. If the participant stands still the system slows down the movies and consecutively only blends stills, motivating the participant to move. Another motivation for movement and change of orientation is the alternation of the main screen, reassigned randomly over time.

4.1 Implementation

The installation is processed by four Dual Processor G5 Mac computers. One computer is retrieving the information of the users movement inside the interactive zone (the tracking computer) and three other computers are providing the video signals for the three projectors (referred as video players). One computer also generates the sound. The tracking computer has the role as control master and the video players are control slaves. At the current state the communication between the computers is based on MIDI. The tracking computer sends all necessary information to the video players and the video player with the main movie/ complex animation sends back the information when one landscape is finished and a new one has to be assigned.

4.1.1 Video tracking

The interactivity network operates through Max/MSP-Jitter. The only sensor used is a video camera the signal of which is evaluated by a Max/Jitter-patch. As this installation was designed to adapt to the recipients and not to specific performers one of the main challenges was to implement the tracking in a way that automatically detects people and does not rely on an operator to define the recipient to be tracked. A form of colour tracking is used but with an infrared camera filter and infrared directional light. Therefore the lighting conditions due to artificial light

sources (such as the projectors) have no effect on the tracking itself. The video signal from the tracking camera is processed in different ways. The real-time video stream is subtracted from a memorized image of the empty environment. To subtract the images successfully, sharp edges have to be avoided because they lead to visual noise. Due to the infrared light and infrared filter the contrast of the image from the tracking camera is very low. So the contrast and brightness are adjusted and the image is blurred for smoother edges and the image is subtracted. Any fine visual noise is filtered according to the pixel size. The resulting image is a good source for the tracking algorithm. From that image the tracking computer mainly retrieves three values - the direction of movement (left, right, forward/backward), the speed of movement (normal, stop, fast) and the coarse horizontal position (left, center, right). The speed and direction are results of observing the participants movement over a certain amount of time. Also in this case movement information (based on x-y position changes) rather than simple x-y position calculations are used to evaluate these changes. The interaction is designed such that state transitions are smooth, so the tracking does not attach to each and every movement. The movement data is evaluated and weighted in order that the response to movement is not overly sensitive, to avoid a fragmentation of the environment. Standstills and movement must happen in several consecutive frames to change the status of the environment. As speed is a parameter that varies considerably (especially in a limited space where no constant speed can be expected) the speed up is triggered if the speed value crosses a threshold, stays at that state and finally slows down to normal speed again. To adjust the behavior of the installation and to adapt it to the surroundings some processing parameters can be easily set.

4.1.2 Video streaming

The video players provide the full PAL resolution video imagery for projection. Each video player is always playing two clips, constantly cross-fading. At either side of the cross-fade the invisible movie gets exchanged, according to the movement of the user. For this process several databases are evaluated to determine the next movie. According to the speed information sent by the tracking computer the video players gradually speed the movies up, or gradually slow them down and stop them. As higher speed means moving faster through the landscape the speed of the cross-fade and the playback rate of the movies is modulated.

4.1.3 Audio

The imagery is supported by spatialized interactive sound. The audio uses four-channel audio-files as the sound source. This material is processed in different ways. The speed of the movement affects the speed of the audio playback. The horizontal position as well as the video cross-fade modulates the spatial distribution of the sound. The sound and imagery in conjunction with the fluid screens allows the participant to experience the installation as a fragile rather than dominating environment.

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