Sculpting Home Atmospheres

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ABSTRACT

This paper presents a demonstration set-up of a rich interactive interface in control of an ambient home atmosphere projection system, managing lights, audio and wall projected video art.

The interface, named the Carrousel, is based on the expressiveness of material, form and movement and allows people to dynamically 'sculpt' a desired atmosphere using expressive gestures. The 'sculptor's' actions on the Carrousel are interpreted by a central computer and translated into an atmosphere with similar expression.

Keywords

Rich interaction, expressive interfaces, home atmospheres.

INTRODUCTION

In the view of Ambient Intelligence, dematerialisation and miniaturisation allows technology to disappear into the background, enabling us to focus on a desired experience, instead of the underlying complex technology. A physical interface between a person and a system (e.g., by speech, touch, gestures) remains necessary however, since our interaction with the world is inherently physical [3].

A key challenge for designers of ambient systems is to provide a physical interface that offers an interaction experience that fits the system and its use context. In light of this design challenge, the authors conducted a case study, aiming to develop an intuitive physical interface in control of a living room atmosphere projection system.

The case study incorporated *rich interaction* [2] as the main design approach. This design approach advocates designing products based on respect for all human interaction skills: the cognitive, perceptual-motor and emotional skill. Today's interactive interfaces tend to draw heavily on a human's cognitive abilities through use of buttons and icons, ignoring or even frustrating the perceptual-motor and emotional skills of people. Capitalising on all human skills opens up new, richer ways of designing interaction possibilities that result in both beauty and usability in interaction.

THE DEMONSTRATOR

The aforementioned case study resulted in a functional system with two main elements: a home atmosphere projection system and a rich interactive interface. These two elements are treated subsequently in this section.

The Home Atmosphere System

Three media, namely (coloured) lighting, audio and wall projected video-art, were selected for controlling the living room atmosphere. The atmosphere projection system was situated in the Studio Home Lab, a space resembling a living room at Delft University of Technology, to create a living room like feel (Figure 1).

Figure 1. The Studio Home Lab with active atmosphere projection system.

In order to combine the media light, sound and video to collectively express an atmosphere, the expressive dimensions of atmospheres were derived using a semantic differential experiment [1]. This resulted in three primary dimensions of experience of atmospheres, named Activity level, Warmth level and Attention level. These three dimensions were used to create a 3D scaling model describing experience of atmospheres as depicted in Figure 2. By arranging video-art (created especially for this purpose), light and music content along the three dimensions coherent atmospheres were created.

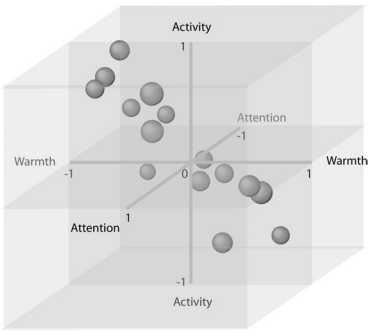

Figure 2: Depiction of atmosphere space with the three expressive dimensions Activity, Warmth and Attention. The spheres represent collections of audio, lighting and video-art content placed as atmospheres in the model.

Expressive Interface: the Carrousel

After completing the functional living room atmosphere projection system, an interface was designed to offer an interaction experience that could fit in this context, balancing playfulness, creativity and usability in interaction.

The resulting interface, the Carrousel, is a small dynamic sculpture that uses expressiveness of form, material and movement to allow people to expressively 'sculpt' atmospheres. The overall look and feel is designed to fit a living room environment. The Carrousel is shown in Figure 3.

Figure 3: The rich interactive prototype, called the Carrousel, allows people to 'sculpt' atmospheres. In the top left picture, the ID-token insertion slot is visible opposite to the flags. The top right picture shows the Carrousel in use in the living room lab context. The bottom two images present two different overall expressions.

The main elements of the functional prototype include four Flags, each with two degrees of freedom (pitch and rotation), attached to a continuously rotating platform. Rotation speed of the platform is constant, but can be changed by grasping the platform. Each Flag has a smooth palm wood surface on one side, and an aluminium surface on the other, so as to create warm and cold sides, respectively. A slot is created in the stage platform so as to enable insertion of an ID-token, such that the user's individual settings of the interface in relation to specific atmospheres can be recorded.

The DC motor is enclosed in a non-obtrusive housing and all electrical wiring is hidden from view. Each Flag is equipped with an encoder and a potentiometer to sample its position. The Carrousel transmits the current Flag orientations and rotation speed through the serial port to a central computer.

The way a person acts on the flags and the stage and the resulting pattern determine the expression of the 'sculpting'. This expressive behaviour is interpreted by the system by mapping parameters describing expressive properties of the flag patterns and movements (e.g., uprightness of the pattern, smoothness of the pattern, interaction time) to the three dimensional atmosphere model (Activity, Warmth and Attention). Initial user studies show this approach to be fruitful, although the required mapping algorithms are complex. In the present demonstrator, simplified mapping algorithms are used.

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