

Sensory Environments Evaluation



The Sensory Environments Evaluation (SEE) project is a three-year funded research effort at the USC Institute for Creative Technologies that is developing the tools and artistry to make emotionally rich virtual environments. These environments will take advantage of the latest in hardware and software to stimulate multi-sensory inputs (sight, sound and smell) in novel ways to produce highly immersive situations. Our goal is to create rich, three-dimensional, multi-sensory virtual environments in order to investigate the ways environments themselves can evoke a range of emotional responses from participants who experience them.

Over the past decade significant advances have been made in both creation and display tools for virtual environments, but relatively little attention has been given to the ways in which these tools can be used to create emotionally evocative worlds. In creating methods to provide these rich emotional experiences we hope to contribute to the creation of virtual worlds with maximum impact.

Advances in the intelligence and emotions of the virtual characters that populate simulated worlds is already an active research area at ICT. The other side of that coin is how the live participant or trainee is stimulated to experience his or her own emotional response. The virtual characters are a part of that personal experience, of course, but environmental and subjective cues also contribute a great deal to the participant's emotional responses within an experience (whether live or virtual). Current VR environments provide little richness that could contribute to a strong emotional response in the live participant.

Our efforts will examine the role of secondary sound cues, olfactory cues, realistic computer graphics effects, and additional lighting effects, as well as the role of memory to create heightened realism and believability in virtual scenarios. Secondary sounds, like distant automobiles, barking dogs, conversations and other peripheral noises will provide the participant a high level of auditory environmental realism. Enhanced graphics will include transparency and layered renders to simulate fog, rain, sleet, dust, and heat distortion. We hope to transition many of the Hollywood effects tricks into the simulation world for more "photo-real-sim". These may also include new lighting techniques such as shadows and glints, lighting extremes & changes (e.g. exiting a dark interior as in a building or tunnel), and depiction of realistic night scenes. The addition of smells (olfactory cues) will permit research into the state and usefulness of current scent delivery systems.



The role of memories and associative reasoning in intense experiences is another primary research vector of the SEE project. **Simply providing rich factual representations of sensory inputs may not be enough to create intense memorable experiences. Our perception of the real world is modulated by factors both phenomenological and emotional that significantly affect the way we perceive. The effective implementation of these aspects will provide a heightened subjective experience.** In films, the viewer is presented a scene specifically designed to stimulate certain responses. This is done with sophisticated art direction, use of music and ambient sounds, and camera views designed to focus attention – cinematic techniques perfected over years of refinement. As cinema has developed its own vocabulary over the last century to stimulate predictable audience responses, we will seek to create the beginnings of a similar set of artistic tools and conventions for the virtual screen.

In its first two years, SEE will implement a number of “snapshot” environments, each designed to provoke a different emotional response or memory in the participant. Experiences will be designed for maximum effect and believability. Participation will be followed by comparative evaluation studies to determine the intensity of the emotional experiences for each participant, with and without specific emotional cues such as smells and ambient sounds. Certain biological systems will be monitored during the experience and factored into the evaluations. Successful elements can then be integrated into larger, story-driven training, educational and artistic environments. In this way we seek to develop tools that provide a rich vocabulary to developers of VR worlds.

The SEE Project builds on the 1992 - 1994 Virtopia Project (1). In the early 1990s at IST, Mike Goslin and Jacki Morie created a virtual reality artwork entitled Virtopia. Through the interface of a barren desert punctuated by several oases, participants were permitted passage to various “worlds” designed to provoke specific emotional responses. These included feelings of haunting, nostalgia, fright and disturbance. The idea behind Virtopia was to go beyond standard VR worlds that were (at that time) little more than walkthroughs of indifferent space. There was little reason to stay in these worlds: they neither held your attention nor captured your imagination. We wanted to make worlds that people would love to stay in, that they would come away from changed in some way. The Virtopia Project was short-lived but had notable successes. The SEE Project aims to expand the lessons learned in Virtopia with the new tools of today to create the most emotionally engaging virtual environments possible.

The SEE Project will also form the basis for an artistic installation entitled “Memory Stairs”. Centered around a spiral staircase, each step a participant (wearing a head-mounted display) takes will present a multi-sensory, virtual “memory” that is designed to provoke emotional response. In addition to the first person experience, Memory Stairs will weave a rich spectator version incorporating a window into the participant’s view and multi-media support of the experiences being presented that only the audience will see.

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