sand:stone, 1999

Synthetic Characters Group,
MIT Media Laboratory
Interactive installation

Inspiration
Throughout history, sand and stones have been a means of communication. Long forgotten as a technology, these aboriginal media are revitalized by our installation sand:stone.

A Meditative Space
This installation creates a space with virtual and physical components. Our virtual world is inhabited by a cast of autonomous characters representing the four elements—fire, earth, air, water.

The physical space is dominated by a garden of stones and sand and by a projected view into the virtual world. Participants in the installation arrange the stones in the sand; their arrangement influences the ambience—mood and music—of the virtual world.

This music is “heard” both by the elemental creatures and by the participants in the space. Each creature responds to a certain musical theme that inspires its mood and behavior.

This work embraces cinema and cave painting, artificial life and life in the tribe, the granularity of pixels and the resolution of sand.

Behavior
In the Synthetic Characters Group, we aim to build whole autonomous creatures. The inhabitants of the virtual space have their own emotions and drives and exist as intentional beings. Their actions are determined by their own desires and beliefs. There is no script.

We create simple but complete creatures who have integrated models of perception, motivation, emotion, behavior, and motor control. At every instant our creatures are in a specific emotional state that affects both what they do and how they do it. The underlying model comes from the study of ethology combined with the approach of artificial life.

We believe that this architecture—the encapsulation of behavior and interaction in terms of autonomous agents—presents a powerful way of thinking about interactive spaces and species.

Our installation reflects our views on behavior. All elements of our world—actors, music, camera, and set—are thought of and designed as virtual creatures.

One might claim that interactivity is blurring the boundaries between the creators of installations and the participants in those installations. But such claims will remain premature as long as the authors work with faceless bits and the users see only animations.

The notion of “character” seems fundamental to our human lives, which are so full of social interactions. We engage in such interactions with notions of agency, intention, and emotion. Unless artificial life plays in these terms, it will always feel artificial.

Music
The music in our installation is created by an unseen “music creature.” The score is composed in real time to reflect not only what is happening to the stone garden, but also what is happening to the characters and how they feel about this.

In this demonstration of our music technology, thematic “threads” are represented by the stones and blended together to fuse ambient soundscapes. Participants can control the blend and the development of the themes by positioning the stones relative to the center of the box.

Our synthetic characters’ complex emotional systems and large behavioral repertoire provide a unique platform from which to explore how this nonlinear medium can sound.
Camera

To control the virtual camera, we have built an autonomous cinematography system that decides the most appropriate shot at each moment. Within the constraints imposed by interactivity, the system incorporates lighting and camera techniques from traditional cinematography to strengthen the emotional impact of the scene.

Interface

The research of the Synthetic Characters Group takes us from advanced “behavior-friendly” 3D graphics systems through behavior systems to issues of interface.

Tangible interfaces that affect characters and the worlds that they inhabit must go beyond the mice, keyboards, joysticks, and monitors of the conventional desktop. By combining the most recent technology with ancient materials, our interfaces span this gap of eons.

The hardware for the stone garden interface is based on active radio frequency inductively powered tag technology developed by Swatch Group.

Goal

The goal of this work is to create a meditative space while juxtaposing the digital and the real, the ancient and the ultramodern, the roughness of stone and the sheen of a digital surface. Participants leave traces of their interactions through the patterns of sand and arrangements of stone.

Technical Information

For this installation, we will be running the system on an SGI Infinite Reality Onyx II Rack and five additional Pentium II machines running NT4.0. We will rear-project onto a 6 x 4-foot screen using an XGA projector. We will be responsible for providing all computational equipment.

The contributors write the software in Java, C, and C++. The system is largely written in Java and utilizes a thin graphics API that allows it to use either Performer on SGI hardware (Irix 6.5) or Cosmo3D on Windows NT 4.0 platforms for rendering. 3D Studio Max R2.5 and Character Studio 2.1 are used for modeling and character animation. GAMUT-DXm is our official 3DSMax exporter.

The installation requires two 30-amp, 220-volt circuits (compatible with NEMA plug 6-30) for the Infinite Reality rack. It also requires two 15-amp, 110-volt circuits for the projector as well as Intel-class computers and other miscellaneous equipment.