

Prix Ars Electronica
Interactive Art
Entry

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Title:

Kinoetic Evolution: Collective Collaborative Computer-Mediated Creation

General:

An audience of thousands of people collectively and interactively create unique geometric forms on a projected video screen.

Space Requirements:

This work can be performed in a theater or outside in a stadium or any open area. The camera(s) should be at least 3 meters behind the last row of seats or group of participants. For best results, the ambient light should be low, for example, normal theater show lighting and outdoor twilight are satisfactory.

Technical Discussion:

Each member of the audience is given a small reflective device, called a "wand", consisting of an approximately 3x20 cm piece of wood or stiff cardboard or plastic with retroreflective tape affixed to opposite sides of one end. The reflective tape is typically red on one side of the wand and green on the other side. Audience members hold their wands comfortably in either hand so the reflective end is approximately eye level. They can see the video screen directly ahead and their wand off to one side. One or more video cameras are positioned so as to cover the entire audience from behind. There is a lamp next to each camera so that when the lamp is turned on, the camera sees an image consisting of reflected dots. The camera's video signal is analyzed in realtime to determine the color of everyone's reflector. This information is used to control the computer making the projected video images.

The computational components of the system consist of a Silicon Graphics Indigo computer and a specially configured image processing computer. The Indigo produces the video signal which is viewed by the audience. The image processor analyzes the camera's video signal and passes the results to the Indigo. The Indigo is controlled by a human operator who selects which program to run and manages the operation of the system. Generally the operator can intervene if the audience is in need of assistance.

Artistic Concept:

The intent of this piece is to explore the creative potential of an activated collective group intelligence. Audiences are far too often passive absorbers of other's ideas. The capability of a focussed, in control, audience is a vast new territory for exploration. We necessarily begin with simple, fun games to train participants in the operation of the system, for example, ping-pong variants and flying an airplane. Their tasks become more complex and rewarding, finally leading them toward the goal of creating pleasing organic geometric forms never before seen. The creative process proceeds jointly, with the computer creating new forms from old, and the audience selecting the forms it wants to see developed.

Theoretical Basis:

The organic form synthesis process is based on a computational model called a 'genetic algorithm'. In a genetic algorithm, an entity is represented in the computer as a linear ordered set of data, similar to a sentence, but containing numbers and mathematical symbols. Special software in the computer can (in this case) interpret the entity's data as a geometric object and construct an image of the shape it represents. Genetic algorithms are distinguished by the processes they employ to explore the space of possibilities. Primarily they operate on the data sets of entities using processes mimicking those of genetic processes: mutation, component swapping, local reordering, etc. The result is that two data sets (corresponding here to two forms) procreate several offspring, whose data sets are created mainly out of parts of their parents, with sometimes some random components thrown in; not unlike natural DNA. Here, the result is that two forms appear to give rise to many new forms, each resembling their parents, more or less, but often exhibiting characteristics not found in either.

The creation process is as follows. The audience is shown several images of simple forms (cylinder, cube, sphere, etc.). They use their wands to choose the two they wish to combine. There are a number of ways the wands can be used to accomplish this. We can have a moving pointer and they can vote for their favorite, or we can show the forms one at a time and they can vote, and so forth. Once the two forms are chosen, the computer creates 6 new forms. This should be quite fast; probably less than 2 seconds. The audience then chooses two new forms to combine. Forms often become more complex with each succeeding generation, resulting in amazingly beautiful intricate organic shapes.