I81

Boundary Functions

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Interval Research
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Description:

Boundary Functions is an exploration of personal space and the relationship of the individual to society. The piece is realized as a set of lines projected from overhead onto the floor which divide each person in the gallery from one another. With one person in the gallery there is absolutely no response. When two are present, there is a single line drawn halfway between them segmenting the room into two regions. As each person moves, this line dynamically changes, maintaining an even distance between the two. With more than two people, the floor becomes divided into cellular regions, each with the mathematical quality that all space within the region is closer to the person inside than any other.

The regions which surround each person are mathematically referred to as Voronoi diagrams or Dirichlet tessellations. These diagrams are widely used in diverse fields, spontaneously occurring at all scales of nature. In anthropology and geography they are used to describe patterns of human settlement; in biology, the patterns of animal dominance and plant competition; in chemistry the packing of atoms into crystalline structures; in astronomy the influence of gravity on stars and star clusters; in marketing the strategic placement of chain stores; in robotics path planning; and in computer science the solution to closest-point and triangulation problems. The diagrams represent as strong a connection between mathematics and nature as the constants e or π.

By projecting the diagram, these invisible relationships between individuals and the space between them are made visible and dynamic. The intangible notion of personal space and the line that always exists between you and another becomes concrete. The installation is non-functioning with one person, as a physical relation to others must be present. In this way the piece is a reversal of the often lonely self-reflection of virtual reality - here we are given a virtual space which can only exist with more than one person.

The title of the piece, *Boundary Functions*, refers to Theodore Kaczynski's 1967 Phd thesis at the University of Michigan. Better known as the Unabomber, Kaczynski is a pathological example of the conflict between the individual and society - the conflict and compromise of engaging in society versus solitude and individuality uncompromised by the thoughts or presence of others. The thesis itself is an example of the implicit antisocial quality of some scientific discourse, mired in language and symbols impenetrable to the vast majority of society. In this installation, a mathematical abstraction is made instantly knowable by dynamic visual representation.

Technical Realization:

The installation consists of an overhead camera and projector aimed at the floor through an intermediate mirror. The camera and projector are connected to a PC computer which performs tracking of the moving people on the floor below using custom software. The software generates the Voronoi diagram which is projected back onto the floor. The accurate tracking of people is accomplished by lighting the floor with even

diffuse light. An alternate solution is to use an infra-red sensitive camera overhead.

Within the room the sensitive area (approx. 16' square) is demarcated by a thin molding on the floor. Only movement within this area will be tracked, so that people can engage and disengage in the spectacle.

Notes on the submission tape:

Enclosed is a 5-minute videotape with two scale mockups of the exhibit. The first is a tabletop test using pieces of cardboard. The second is a room-sized mockup with approx. 8 feet by 6 feet projection and 4½ x 3½ sensing area. I've squeezed four or five people onto the floor to show the interaction potential, however the final installation should be much more spacious at 16' square.

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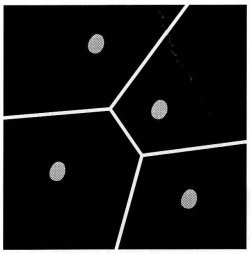
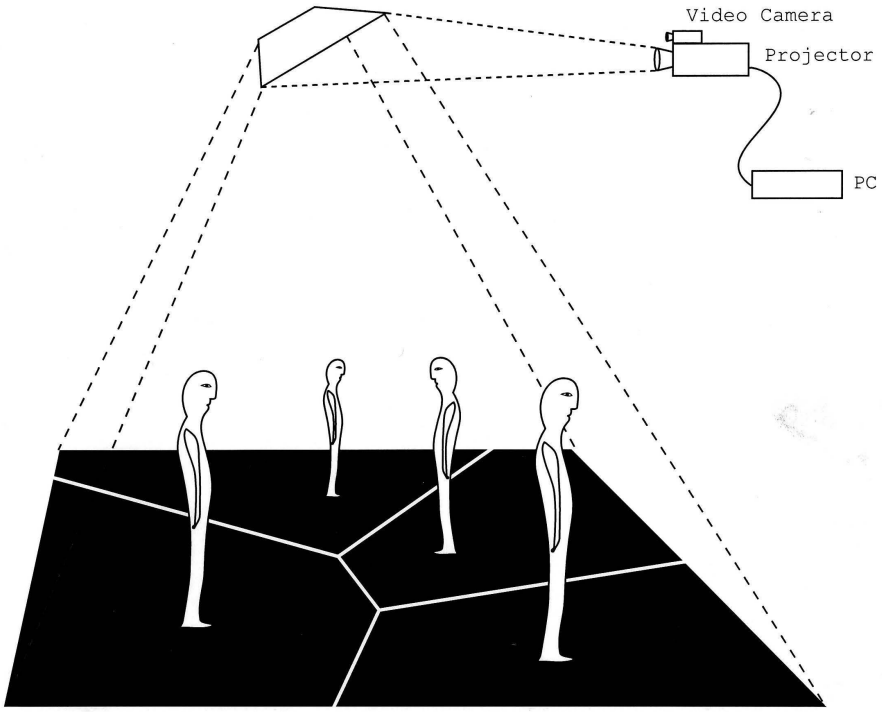
Overhead View





Approximate height 18'
Size of projection 16' square

Not shown:
- lights around edge of floor
- moulding around active area

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