MSA's Attractors: Navigational Aids for Virtual Environments

(SIGGRAPH'99, Conference Abstracts and Applications)

Agueda Simó
Division of Animation and Digital Arts
School of Cinema-Television
University of Southern California
asimo@jet.es

An interesting and difficult challenge in designing a virtual environment is to attract the user's attention to an object or area with rich interactivity. If not guided, users could easily miss these special objects and areas. They would not be fully engaged by the virtual world we had designed for them. Disoriented and frustrated, the magic of the virtual world would be lost.

We solve this problem in our environment called *Microworlds, Sirens and Argonauts* (MSA). In MSA we use the mathematical concept of "Attractors." In our environment our attractors act like the Sirens in Jason's famous Greek voyage. The user, like an Argonaut, is drawn to special locations by the magnetism of the attractor's 'song.' The attractor leads the Argonauts to a perfect position. From there they can view an interesting perspective of an object or reach the specific part of an object we want users to touch or pass through.

ATTRACTORS CHARACTERISTICS

MSA uses spacialized sound objects to allow the user to find attractor regions. When users enter an area of attraction they are pulled to a specific position called *the final position*. To achieve this, a path between the user's current position when entering the attractor and the final position is built on the fly. At this point, users loose navigational control until they reach the final position. Because the path is built on the fly and the entry point of the attractor region varies between flights, there will never be two identical paths to the final position. Thus every "trip" is a unique experience.

Interocular distance and sensitivity of the 3D mouse is carefully controlled for each virtual object using attractors. Both parameters are modified at the final position. This greatly improves navigation. Otherwise if the sensitivity is not adjusted, the user's movements in the virtual environment may be either too fast or slow to move around and explore some objects. If the interocular distance is not controlled, it may be so big with respect to small objects that when users get closer to them, they suffer from diplopia. Attractors solve both problems.

When the user reaches the final position the attractor is de-activated, and will be re-activated when the user passes through a given boundary.

In addition, the attractor's magnetic area decreases each time the user visits it until it reaches a minimum size. This avoids the problem of the user being pulled to the same attractor each time.

Attractors variables:

For each attractor we can define the following variables:
-Origin
-Area of attraction and its minimum size
-Border of re-activation
-User's final position
-Final interocular distance
-Final 3D mouse sensitivity
-Spatialized sound area

Attractors let Argonauts navigate freely, explore the virtual 3D space discovering new emotions and thoughts. They facilitate the user's navigation and interaction within the environment. They help users orient in virtual space by providing navigational sound clues. Users can follow the spatialized sounds and make virtual "musical maps."

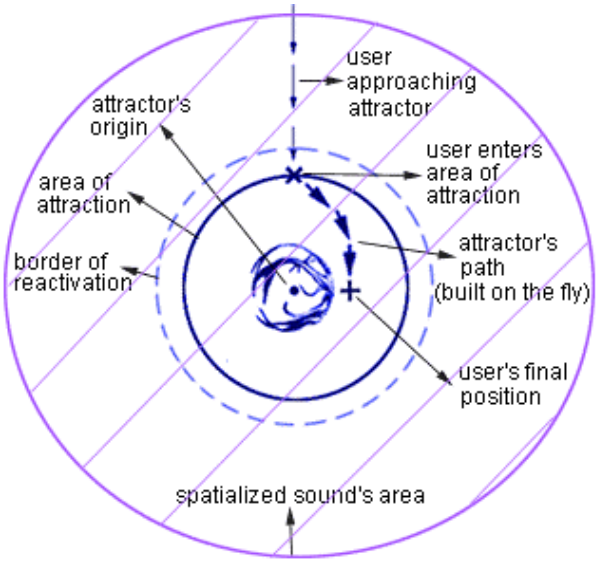

Fig. 1 Attractor scheme

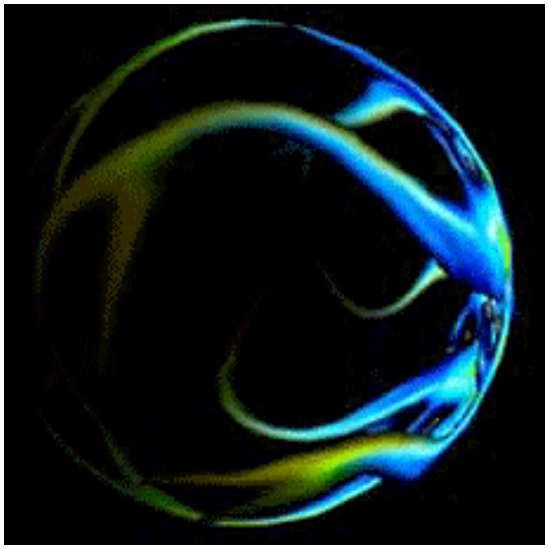

Fig. 2 Virtual Object

Attractors programmers: Juan Francisco López and Yu Uny Cao.

Acknowledgements:
This project has been partialy funded by The Labyrinth Project and the Annenberg Center for Communication. The author wish to acknowledge Vibeke Sorensen for her support and inspiration, Richard Weinberg and the USC Computer Animation Lab for supporting the project, Iguana Robotics Inc. for its valuable input to this research, FIGD for the donation of SAS (Spatial Audio Server), Robotiker for the use of their computers and support, WorldToolkit for providing so many temporary licenses and support, SGI, Stereographics, BARCO, Vrex, Lake DSP, and Intel for the loan of equipment and support.