

FlowField: Investigating the Semantics of Caress

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1. Introduction

We have created a new interactive experience piece called FlowField. Participants touch and caress a multi-point touchpad, the MTC Express, in a CAVE (CAVE Automatic Virtual Environment), directly controlling a flowing particle field. Collisions in the particle field emit musical sounds providing a new type of musical interface that uses a dynamic flow process for its underlying musical structure. The particle flow field circles around the participant in a cylindrical path. Obstructions formed by whole hand input disturb the flow field like a hand in water. The interaction has very low latency and a fast frame rate, providing a visceral, dynamic experience. In FlowField, participants explore interaction through caress, suggesting reconnection with a sense of play, and experience a world through touch.

2. Interaction Experience

The FlowField installation allows participants to immerse themselves in a virtual flow field of particles (Fig. 1) displayed on a four-screen CAVE. By using hands and fingers on the MTC Express, users can interact directly with the flow by introducing obstructions in the path of the particles (Fig. 2). The effect is not unlike placing one's fingers into a stream, experimenting with blocking the flow of water. The experience is complemented by a dynamic soundscape caused by the particles striking the obstructions. The combination of sound and visual sensations brings the interaction activity to life, ebbing and flowing in intensity with the particle flow, as directed by you.

By applying one's hands and fingers onto the MTC Express in different ways, interesting flow patterns can be developed that are aesthetically pleasing. Multiple touchpads can be used to enable a group of users to interact with the same flow field, creating an interplay of particle and sound between users, who can work with independently or against each other to generate complex interference patterns, all while immersed in the swirl of activity.

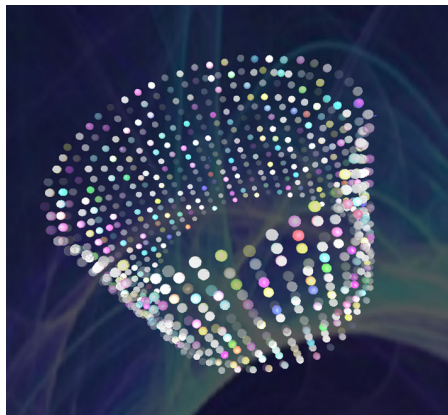


Figure 1: Cylindrical particle field. In virtual space, users are standing inside the cylinder while the particles revolve around them.

3. Motivation

The human sense of touch is as well developed as our senses of sight and hearing, yet while there are plenty of devices that deliver and receive visual and auditory information, the same cannot be said for the tactile sense. Even with very complex and compelling virtual reality display systems such as the CAVE, there is often little means of providing tactile input or output. The FlowField system instead uses the pressure-sensitive, multi-point MTC Express, developed by Tactex Controls, Inc. to give users a new form of tactile input.

Another purpose of this work is to explore the semantics of gesture and its application in interactive systems. In particular, the nature of the touchpad allows us to study interactions between the hand and a solid surface. The important property of this type of interaction is the inherent repeatability of gestures when performed on a fixed surface. This is in contrast to unconstrained gesturing, such as sign language, which can be recognized using glove-based devices or video capture.

4. Related Work

FlowField exhibits several attributes necessary for a compelling interactive installation, including instantaneous response, implemented with low latency and fast sample and rendering rates, and a balance between visual and musical quality [Fels et al. 1997; Fels and Mase 1999]. Furthermore, having a direct relation between action and result and a reflection of self in the stimulus (hand shape seen in obstructions) is an innovation.

5. References

- FELS, S., AND MASE, K. 1999. Iamascope: A Graphical Musical Instrument. *Computers and Graphics*, 2(23), 277-286.
- FELS, S., NISHIMOTO, K., AND MASE, K. 1997. MusiKalScope: A Graphical Musical Instrument. *Proceedings of IEEE International Conference on Multimedia Computing and Systems*, 55-62.

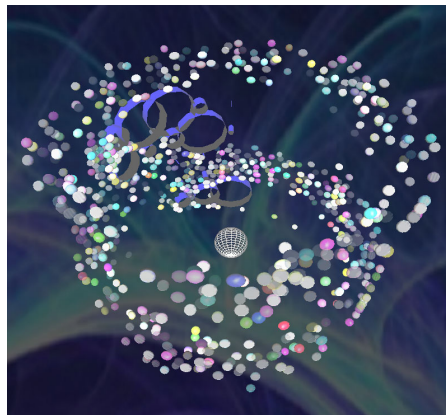


Figure 2: Whole-hand input from the MTC Express creates obstructions (blue circles) that affect the flow of the particles.