

# Cubee: Thinking Inside The Box

Ian Stavness\*

Florian Vogt†

Sidney Fels‡

Department of Electrical and Computer Engineering  
University of British Columbia

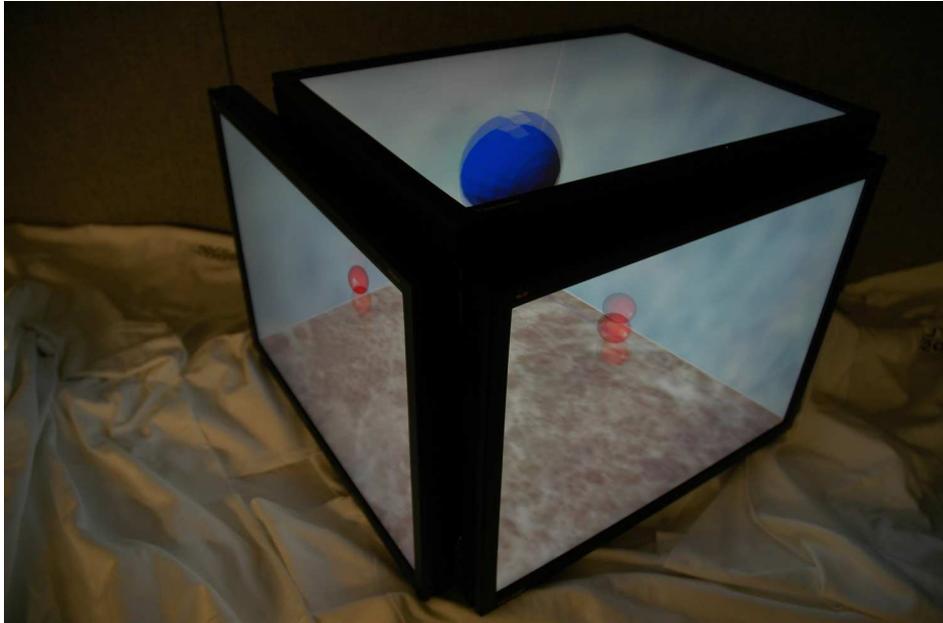


Figure 1: The interactive Cubee display showing bouncing balls.

Cubee is an *interactive* cubic fish tank VR display that is suspended to enable viewing from all sides and free manipulation. The display motion is mapped into the virtual scene to create a compelling interaction metaphor of objects inside a box. The system presents a tangible way to evaluate interactive realism of dynamic simulations.

The goal of the Cubee exhibit is to create a unique physical experience with computer-generated, physics-based animation through an interactive 3D display system. Cubee brings dynamic simulation into the participant's physical space and supports interaction that maintains a coherent relationship between the virtual and physical worlds.

## Innovation

Cubee encloses a small virtual space inside the physical boundaries of a cubic display. It establishes the metaphor of objects contained within a physical box in order to achieve an engaging interactive experience.

The display extends head-tracked perspective rendering by allowing interaction with a multi-display system that renders virtual objects behind the display plane as if they are inside the box. This display technique differs from the conventional approach, in which virtual objects float in front of the display [Djajadiningrat et al. 1997],

\*e-mail: stavness@ece.ubc.ca

†e-mail: fvogt@ece.ubc.ca

‡e-mail: ssfels@ece.ubc.ca

and enables the seams of the LCD panels to be used as occlusion cues to help realize the “inside the box” metaphor in a similar manner to [Inami 1997].

Cubee's design affords a large movement space around the entire display, which enhances motion parallax cues for a strong 3D effect. The display is suspended so that participants can move around it or move it around. Participants are not required to use a mouse or other input device to manipulate objects in the virtual scene: movement of the display causes the objects to respond just like real objects in a real box.

## Vision

Real-time dynamic simulations of any variety, including multiple rigid-bodies, fluid, sand, smoke, or other natural phenomena are uniquely suited to this type of display. In the near future, Cubee displays could become the de facto standard test bed for examining and evaluating the realism of physics-based computer animation.

## References

- DJAJADININGRAT, J., SMETS, G., AND OVERBEEKE, C. 1997. Cubby: A multiscreen movement parallax display for direct manual manipulation. *Displays* 17, 191–197.
- INAMI, M. 1997. Media3: the virtual hologram. In *ACM SIG-GRAPH 97 Visual Proceedings*, 107.