

The Octagon

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1. What is it?

The Octagon enables a number of users to work together to build a virtual sculpture. It was originally conceived as eight computer screens working as windows into an eight-sided room. But it has grown to accommodate a variable number of users.

It is also an experiment in user-interface design. Interaction is performed entirely by gestures using only click and drag operations. In the virtual room, tools are represented as 3D models and provide the context to turn these basic gestures into a useful set of building and coloring operations.

2. What does it look like?

The basic screen layout is shown in Figure 1. In the center of the room is a stage on which building takes place. The user can rotate the stage simply by dragging the edge of it right or left.

To the right of the screen is a toolbox that resembles a bookshelf. On it are found shape-tools that enable you to construct spheres, triangles and pipes: generalized cylinders. Lying on the floor is a bomb that represents a delete tool, a number of paint pots, a paintbrush and an eyedropper.

These things work intuitively. To be more precise, they are easy to use for those already familiar with the point-click and drag metaphors for object manipulation.

To make a tube you select the tube tool and drag a path starting and finishing on the stage or on objects you have already made. You can select the color of the object by 'dipping' the tool into one of the paint pots. Just click on the chosen pot. You can set the diameter of the cylinder by adjusting a slider above the image of the cylinder tool.

To make a sphere you pick the sphere tool. Click where you want the sphere center and drag to get the desired radius. You can, of course, 'dip' your cursor into a paint pot to change the color of the sphere tool.

To make a triangle select the triangle tool and click three times. What could be simpler?

To the right is a second bookshelf. It is a color mixer. You can select the color using RGB sliders – obvious to computer graphics folk, or by injecting red, yellow or blue paint into a mixing pot.

You can drag the mixing pot to one of the paint pots to change its color. The paintbrush acquires the color of the last paint pot it touched and can be used to color existing objects. The eyedropper allows you to set the color of the mixing pot to be the same as the color of an existing object.

You create, recolor and delete objects at will including those made by other users.



Figure 1. Octagon Screen Layout

3. Behind the scenes

The core of the Octagon is a communication system using a robust client/server model. The client is the sculpture drawing program and the server runs independently over a network. Each operation that changes the sculpture consists of a request constructed from the user's action that is sent to the server. The server maintains a consistent model and the client draws components only in response to messages from the server.

When a new client joins the network, the present sculpture is sent immediately. Clients can come and go at will. We have run the system with up to ten screens and, so far, everything seems to work consistently.

4. 2D gestures — 3D results

We use a simple, consistent set of rules for converting the screen based 2D gestures into 3D instructions for building. The rules necessarily restrict what can be done but most users seem to be unaware of this.

5. Further information

The short video on the SIGGRAPH Asia DVD ROM shows the system in operation.

We are continuing to develop this project and the version shown at the conference may have different or additional features.

There is a website:

<http://www.cs.otago.ac.nz/graphics/octagon>

where information on the latest version may be found.

At present the system runs only in Mac OS. Full source code is available and in the public domain. We invite your collaboration.