Water Walls Shore Up Digital Creativity
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by Alex Ulam

Virtual architecture is on the verge of leaping from the computer screen into real life. Engineers and architects from the Massachusetts Institute of Technology (MIT) have designed a building made of water: a Digital Water Pavilion to be erected next summer at the 2008 World Expo in Zaragoza, Spain. Sponsored by the City of Zaragoza, the 5,000-square-foot, rectangular building will contain displays about the future of Zaragoza and its new technology-oriented Digital Mile district.

Architects have been using computers to experiment with reconfigurable architecture throughout the past decade in the hope of creating interactive structures that respond to human needs in real time. But until the advent of new software—the pavilion’s designers used standard CAD applications as well as a proprietary java-based program and the open-source programming site processing.org—and new types of sensor technology and water solenoids—electrically operated water valves—this malleable type of architecture existed primarily on a conceptual plane.

“Now we can put the physical and digital together,” says Carlo Ratti, the head of MIT’s SENSEable City Laboratory, which focuses on cities and technology. “This is a way to have responsive architecture—a way to have bits and atoms seamlessly merge.”

The walls will be produced by a water pipe suspended 16.5 feet in the air, punctuated by closely spaced solenoids. These computer-controlled valves will be opened and closed to create gaps in the water so that people can walk into the pavilion without getting wet, and to manipulate the walls into parabolic shapes and patterns. The pavilion’s roof, made of a composite covered by waterproof stainless-steel sheathing, will be submerged in a layer of water. Hydraulic pistons will raise and lower the roof, and the entire structure can be lowered into the landscape when not in use.

A water-walled building is especially appropriate for Zaragoza and other places with a hot and dry climate, Ratti says, because it is chilled naturally by means of evaporative cooling, removing the need for artificial air conditioning. But the technology can also simply be used as a purely sculptural element. “The point that we want to make is that digital architecture should be able to totally appear and totally disappear.”
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