New Digital Water Pavilion to Make a Splash in Spain

MIT architects and engineers have designed a building made of water, its liquid curtain walls programmed to feature digital imagery and to sense an approaching object and part automatically to let it through.

Initially conceived and developed in a Smart Cities workshop at MIT led by Bill Mitchell and Dennis Frenchman, with Michael Joroff and Carlo Ratti, the Digital Water Pavilion was designed at Ratti’s firm in Torino and will be unveiled at an international exhibition in Spain next year, Expo Zaragoza 2008, and located at the entrance near a new bridge by Zaha Hadid.

The water walls that make up the structure consist of a row of closely spaced valves along a pipe suspended in air. The valves can be opened and closed at high speed, producing a curtain of falling water with gaps at specified locations – a pattern of pixels created from air and water instead of points on a screen: the entire surface becomes a one-bit-deep digital display that scrolls downward continuously.

All the walls of the pavilion will be made of this digital water and will act as large displays featuring letters, text and interactive patterns. ‘You could throw a ball at the wall,’ says Mitchell, ‘then see an open circle drop down to meet it precisely where and when its trajectory intersected the water surface. And, with suitable programming, touching the water surface at any point can propagate patterns horizontally, along the wall, to other locations.’

Equipped with suitable sensors, the water walls can also detect your approach and part like the Red Sea, allowing passage at any point, subverting the notion of a door as something found at a fixed location. The roof of the pavilion roof will be covered by a thin layer of water and supported by large pistons that enable it to move up and down. When there is too much wind, the roof will lower; when the pavilion is closed, it will collapse to the ground and the entire structure will disappear.

The pavilion illustrates the potential of digital water as an emerging building material. While there have
been prior attempts to control water droplets digitally, this is the first time the idea is being used to create architectural space. Since plumbing and electronics are not inherently expensive and recycled water is plentiful and cheap, water walls could conceivably be created on a large scale.

‘The dream of digital architecture has always been to create buildings that are responsive and reconfigurable,’ says Ratti. ‘Think about spaces that can expand or shrink based on necessity and use. It is not easy to achieve such effects when dealing with concrete, bricks and mortar. But this becomes possible with digital water, which can appear and disappear.’

The design of the Digital Water Pavilion was carried out at Ratti’s architecture office in Italy (carlorattiassociati) by Ratti, Walter Nicolino, Claudio Bonicco and Matteo Lai; the engineering company Arup (London, UK and Madrid, Spain); and landscape architects Agence Ter (Paris, France). To see a video of the concept, visit www.digitalwaterpavilion.com.


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