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September 2007



DESIGN
WANDERLUST

Christian Lacroix's

journey from Haute Couture
to Hotel Fantasies



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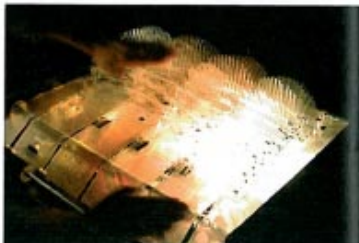
Shape Shifters

Architecture schools use robotics to design buildings that react to the environment.

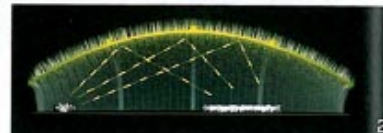
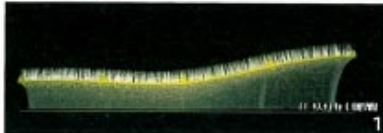
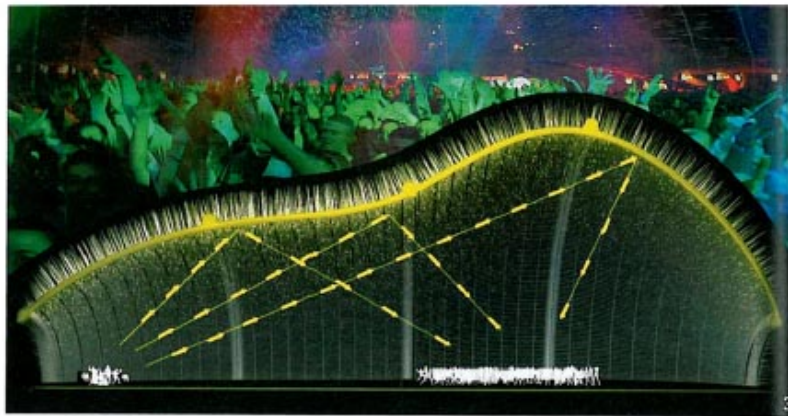
A nightclub morphs as people move around it, opening wider for larger crowds and adapting its shape and size to where people congregate. A tower transforms itself from a circle to an ellipse to adapt to high wind conditions. These scenarios are not just dreamy CAD designs but actual functioning scale models complete with tiny motors to move building elements, and sensors and programming that allow the structures to adapt to activity around them. They were created in the University of Virginia School of Architecture's Robotic Ecologies seminar, in which architecture students collaborate with classmates from computer science and even music backgrounds to design structures that interact with their environment by shifting form.

The idea of melding today's increasingly sophisticated robotics into building design is a leap forward. But this class is not just about dreaming up the next generation of glass-and-steel Transformers. For all its forward thinking, it actually emphasizes the practical skills required to build functioning models—a big step for architecture education, which too often is mired in computer designs and theory. "Students learn programming, and work with microcontrollers and electricity," says assistant professor Jason Johnson, who conceived and teaches the course. "They all get their hands dirty and learn a hell of a lot."

Alex Kong, who took the course last year and is now a junior architect at Kohn Pedersen Fox Associates, appreciates how it forced him to work through the complexities of building kinetic designs. "There is a real practical value to it," he says. "I learned a lot about building, and about how sensors and microcontrollers and all these elements interact." Seth Edwards, a graduate of the program who also took the class, sees robotics as a way to make



Above: A 1/16th-scale model senses motion in the room and shifts using a system of scissor-truss joints.



Above: Diagrams and a rendering of the Rave Space show its dimensions changing in response to use. 1 The building expands or contracts in tandem with the circulation of people. 2 and 3 For live performances, the ceiling moves to optimize acoustics.

continued from page 96 buildings more energy efficient and to connect them to the natural world. One of Johnson's prototypes, for example, is a building that can be linked to real-time weather updates that would alert it to high winds and other extreme conditions, allowing it to cut wind resistance by changing its shape or to open a rainwater collection system when a storm is passing over. "If kinetic buildings can sense something going on in the environment and respond to it, they are no longer stale objects," Edwards says. "They become more like plants—they are actually more connected to nature."

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Far-fetched as it may seem, robotic buildings are already starting to be realized in places like Dubai—itsself a sort of Second Life fantasy world for architecture—where two separate towers designed to rotate are in the works, including one by Israeli-Italian architect David Fisher that will have separately controlled floors and generate its own electricity with wind turbines. But when it comes to integrating kinetic interactivity into architectural education, Johnson is not alone. Design consultant Axel Kilian has taught similar classes at the Massachusetts Institute of Technology. Los Angeles-based architect Michael Fox has also taught classes on the subject at the Art Center College of Design and the Southern California Institute of Architecture. Though it still may be some time before solar panel-clad buildings track the sun like sunflowers, opening students' eyes to these possibilities is important, if only to help them see what is possible. "You understand that a sensor reacting to something is not magic," Kilian says. "And maybe when they go to work they will be more likely to argue for incorporating these kinds of things into their projects." —Jim Rendon



The prototype of a shape-changing tower quivers in response to movement, simulating a reaction to changing wind conditions.