

PHILIP BEESLEY.
PHOTO PHILIP BEESLEY ARCHITECT INC.

TEXT TERRI PETERS

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ENVISIONS AN ARCHITECTURE THAT BREATHES AND GROWS



Entering the installation, visitors weave around and through a disorienting laser-cut acrylic 'forest' hanging from the ceiling. It moves gently, sensing their presence, and performs various caressing and rippling motions. Feather-like branches reach out to visitors with their transparent skeletal appendages, equipped with dark liquid 'bladders'. The alien limbs track visitor movements using embedded microprocessors and infrared proximity sensors, enabling interaction with those around them.

Hylozoic Soil is a kinetic sculpture designed by Canadian artist, architect

and professor Philip Beesley together with engineer Rob Gorbet. The light-weight landscape of moving, licking, breathing and swallowing geotextile mesh has been awarded the coveted VIDA award in Madrid, a unique prize recognizing electronic works of art produced with artificial life technologies. Inspired by coral reefs, with their cycles of opening, clamping, filtering and digesting, the project is rife with architectural potential. Inside the space, it is a magical and immersive experience. Acrylic 'whiskers' twitch out of the corner of your eye, needle-

tipped prosthetics slowly move around you, and wheezing air pumps create an environment with no clear beginning or end. Once you enter the room, you feel immediately 'inside it' and you can only hope it's friendly.

'It could be seen as a building material for the future, capable of high performance energy exchange, or as an environmental threshold,' says Beesley from his office at Waterloo University in Ontario, Canada. 'It's measurable, it has a particular scale, and it can be applicable to architecture, surfaces or building.' But it's hard to

imagine a building actually behaving like this: breathing, eating, resting, reacting and digesting. At first glance, it is a futuristic, robotic landscape, part science fiction and part comforting, organic enclosure. But Beesley's work goes beyond superficial aesthetics and raises real questions about the imbalanced relationship of humans to their environment. Is experimenting with artificial life technologies the next step in the profession's digital revolution?

'It is safe in the known territory of robotics, but the liquids add an element that is both nurturing and rather creepy,'

says Beesley. Digestive liquids including brine and soy fill the bladders and hypodermic needles inject and transfer materials within the system. To counteract the liquids, Beesley explains, 'other glands are filled with salt, serving a "hygroscopic" function that pulls fluids out of the surrounding environment. These material exchanges are conceived as the first stages of dependent interactions where living functions might take root within the matrix.' The sublime sculptural environment could forecast both a disturbing and yet strangely compelling direction for architecture. Beesley cites action painting and immersive theatre environments among other 'obvious' source materials. He says he is recasting these artistic practices using contemporary interactive technologies, computational modelling and digital manufacturing. As a result, *Hylozoic Soil* is a difficult installation to define or categorize. It's not art like you've ever seen it, it's not architecture because it's site-less, wall-less and generally too difficult to decipher, and it's not even about groundbreaking technologies. 'You get a prickling sensation, it is on the edge of emotions,' he says. People don't know how to react in something so strange and yet familiar, with breathing surfaces and latex air pumps. 'Things can get queasy.'

The VIDA exhibition was held, perhaps appropriately, in a converted gallery space inside a crumbling Baroque *matadero* (slaughterhouse) in Madrid. *Hylozoic Soil* is named for hylozoism, the philosophical view that all material things possess life – even architecture. 'It's an immersive environment, it's about being inside something, not being on top of it and owning it, but being swallowed by it, with a sense of vertigo,' Beesley says. In the dark space, he creates dramatic lighting by 'leaking in pins of light, like a Caravaggio painting. As opposed to science-fair lighting, where you look at a thing proudly, like an instrument.' Installing the *Hylozoic Soil* installation was like an intense 'composite, layered quilting bee' that went on for nearly a week, and the adrenaline-fuelled, mass assembly process involved coordinating the spatial and mechanical installation of more than 100,000 individual components. A black box was inserted into the enormous room, with air all around it and inside 20 fulltime volunteers sat in circles, sorting pieces, assembling, mass manufacturing and creating a working rhythm.

A number of Beesley's earlier interactive works have been installed in natural surroundings, such as the one

on the Palatine, the labyrinthine artificial mountain that overlooks the Forum of Rome, and yet his newest works are installed in gallery spaces. 'Gallery installations allow for half-formed possibilities, sketchings of possibilities, it's a laboratory space,' says Beesley. But since his ideas are put to the ultimate test of full-scale realization, they are 'brutally filtered through fabrication.' 'If a team of 20 people find it so fussy and frustrating and they get angry and quit, or start cutting their fingers, or can't understand how it works, then it becomes almost Darwinian,' he says. 'It's a different process than if it had stayed in a conceptual realm, as a rendering or scale model.'

Last year Beesley collaborated on another immersive environment, *Endothelium*, shown at the Pratt Institute in New York, where he led a workshop for students called Responsive Robotic Architecture. Together with Richard Sarrach and C.W. Wang, the result was an experimental and responsive, 'kinetic ceiling soffit'. The installation uses silicon and latex inner blades that act

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like 'air muscles', pulling inwards like a muscle flexing when they are inflated, while hinged to a flexible meshwork. This creates swallowing motions that could be imagined as a kinetic architectural surface. 'It is loud, strong and intense in its presence, a totally different scale from *Hylozoic Soil*. It is more public and durable,' says Beesley. 'I think it qualifies more as architecture. The emotional edges shift as well, the visitors are less quiet and contemplative. It huffs and puffs, and the valves let air in and out.'

After many studies of interactive immersive sculptures that create extreme environments, Beesley began thinking of how to make the installation more 'alive'. He began to experiment with self-generation technologies. The result is *Endothelium*, which Beesley showed in December 2008 at the Body Art Disease Symposium in Los Angeles. It's true, many interac-

tive artists talk about self-generating technologies but how are these really established? Working together with collaborator Hayley Isaacs, this new work is vastly different from the muscular robotics of *Hylozoic Soil* or *Epi-thelium*. *Endothelium* focuses on faint movements to create more subtle, slow results. 'The basic behaviour is very forlorn – you don't watch it for visual entertainment!', he says with a laugh.

Named for a cellular boundary layer in organic physiology, *Endothelium's* cell wiring is arranged in series, feeding into miniature electronic circuits that gather the weak currents and emit pulses of power when sufficient strength accumulates. It is a field of organic 'bladders' that are self-powered and that move very slowly, self-burrowing, self-fertilizing and are linked by 3D printed joints and thin bamboo scaffolding. The bladders are powered using mobile phone vibrators and have LED lights. It works by using tiny gel packs of yeast which burst and fertilize the geotextile. Visitors stir the air, directing humidified air and dust par-

had unexpected emotional responses to the project. 'The faint little bursts of energy create a curious effect of unlocking an almost nurturing, parental energy,' he says. 'You know, I cared about the thing and so did people around it. It was just trying so hard to use its own resources.' Subtle yet powerful, *Endothelium* challenged the relationship between people and their environment. 'Sure, it's a risk, but a lovely ethic of exchange.'

The dream of creating architecture that moves has always been a preoccupation of architects, long before Archigram's Walking City and contemporary examples in the digital age by architects such as Zaha Hadid and Asymptote. And now new buildings are even being designed using animation software, which of course implies movement, but it is perhaps surprising how rarely experimental architecture really does literally respond or move in its environment. Beesley couldn't be farther intellectually or formally from architects such as Hadid, with his interests in ethics and emotional responses, but both have an urge to create bespoke, dynamic surfaces using customized digital tools for design and manufacturing.

The critical difference is that while Hadid's aerodynamic and sculptural works have the aesthetics of movement, Beesley takes the idea in a completely opposite direction. Rather than starting with a shape or moulding an emerging sculptural form, he looks to create a nurturing environment where an 'architecture' can breathe and grow. The aesthetics of Beesley's work are radical; his work goes beyond indicating movement, with a swooping canopy or streamlined form and beyond the expressive responsiveness of a pixelated-looking façade. Beesley is designing an emergent system, a living architecture, which communicates, adapts and breathes. As his ambitious kinetic sculptures increase in scale they propose hybrid possibilities as future architecture, pointing to new possibilities for an architectural avant-garde.

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'The entire thing died pretty quickly, just like we knew it would. It wore out, and subsided into silence,' he says. 'As a sculpture it was potent, but as a technology, it was a failure. But somehow on the edge of these things it was very effective. I think you have to call the bluff on technology – ask, does it work?'

Experimental kinetic environments such as *Endothelium* could lead to exciting new potentials for architectural surfaces. 'I don't want this to devolve into science fiction,' he says, 'a further investment into the practical implications is needed.'

Beesley found visitors and makers



PHOTOS PHILIP BEESLEY

‘It might be afraid of you, it doesn’t necessarily like you’

— Philip Beesley —

Epithelium

Pratt Institute of Art and Design

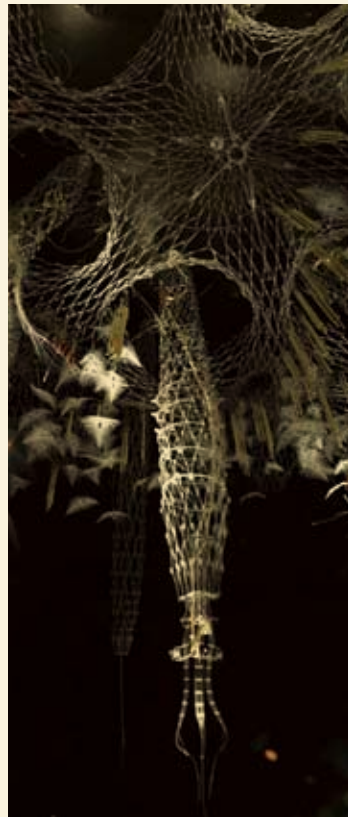
New York, 2008

Epithelium is a responsive 'kinetic ceiling soffit' that uses silicon and latex inner blades that act like 'air muscles'. Like many of Beesley's other works, the installation is controlled by Arduino microprocessors, and it senses and tracks visitor movements. 'It might be afraid of you, it doesn't necessarily like you,' he says. 'It's about creating basic narratives of attraction and repulsion.'

Hylozoic Soil

Musée des Beaux-Arts,
Montreal / **Matadero**, Madrid,
2007 / 2009

Hylozoic Soil is a complex and sensitive installation, a 'living' system, designed using parametric tools and built using digital fabrication techniques. The underlying skeleton is like a gothic umbrella, a finely corrugated meshwork created from tens of thousands of custom, snap together 'chevron'-shaped acrylic tiles. This is mounted on a series of tension rods between floor and ceiling surfaces. Mounted on this framework are hundreds of mechanisms controlled by microprocessor sensors that create swallowing breathing and curling movements. A final layer of what Beesley calls 'weeds' are barbed traps and bladders that crowd the remaining surfaces.





PHOTOS MICHAEL POWERS

**‘I don’t want
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Endothelium
The California NanoSystems
Institute
Los Angeles, 2008

Endothelium is an automated geotextile, a lightweight and sculptural field housing arrays of organic batteries within a lattice system that might reinforce new growth. It uses a dense series of thin ‘whiskers’ and burrowing leg mechanisms to support low-power miniature lights, pulsing and shifting in slight increments. Within this distributed matrix, microbial growth is fostered by enriched seed-patches housed within nest-like forms, sheltered beneath the main lattice units.

