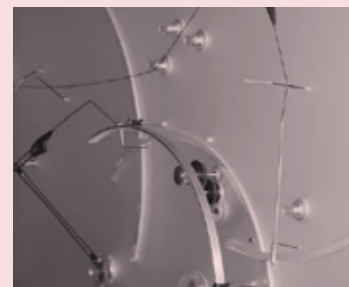


METTE RAMSGÅRD



LACER
METTE RAMSGÅRD THOMSEN
PHOTOS ANDERS INGVARTESEN



'I've never really been one of those girls who sew their own clothes,' says Mette Ramsgård Thomsen, an experimental Danish architect, computer scientist and interactive-textile designer from a sunny café on the Strøget in Copenhagen. I've asked her if people stereotype her architectural works, which involve movement, dance, interaction, fabrics and interiors. In architecture, integrating textile and interactive design tends to be associated with a feminine, non-scientific approach to the discipline, but Thomsen's growing portfolio of innovative works – done in collaboration with her research group, CITA (Centre for Information Technology and Architecture), at the Royal Danish Academy of Fine Arts, School of Architecture – extends beyond such stereotypes.

As Thomsen's works become increasingly larger in scale – ex-

amples are last year's Slow Furl, a soft, 13-m-long interactive robotic membrane; and devA, a computational experiment using steel laser-cut cones – they begin to point to full-scale propositions of alternative building skins and interactive façades. 'When I was studying architecture, I became interested in computers and programming. It was the mid-90s, and at the time we all thought "real time" was such an interesting possibility for computing,' she says. 'But the computers that could do this – massive silicon-graphics machines – were so unbelievably expensive that I took just any job anywhere I could find a machine.'

After graduation, this pursuit led to a series of rather unusual jobs that allowed her to gain experience and to experiment with new technologies. 'I worked in a film studio, at a place that made 3D animations for raves, and at

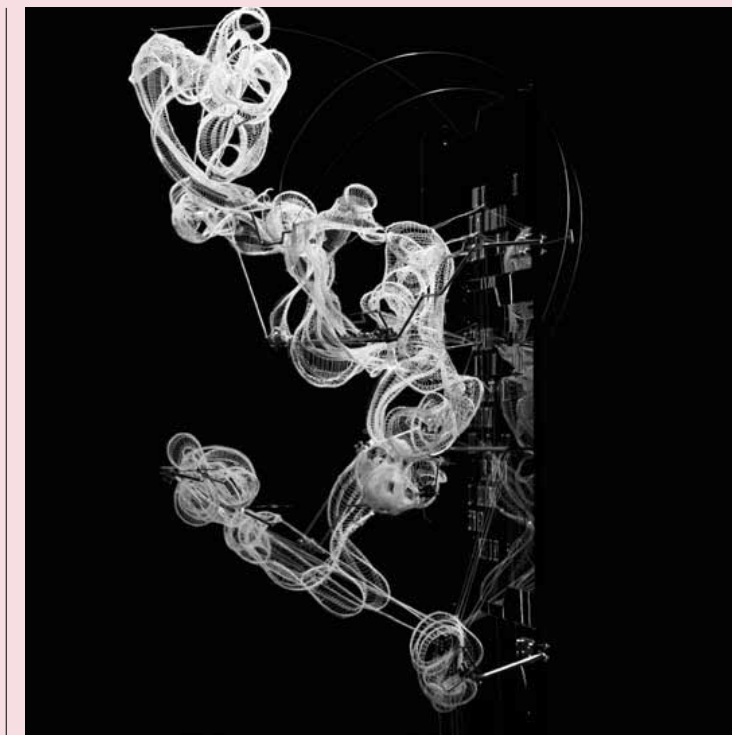
a hospital where they do brain scans. I ended up in Germany at the Fraunhofer Research Institute working with interface technologies, after which I did a joint PhD in London in computer science and architecture.' Despite her multidisciplinary education, Thomsen's approach, consistently architectural, has been about making and interacting with space, form and material, albeit in an experimental, nonstandard way. 'I came to computer science through an interest in robotics,' she says. 'I had this ambition to sew my own robot.'

'My first robot was called Lacer,' she continues. 'I built it when I was in the UK and here it is, still hanging over my desk.' Laughing, she refuses to tell me about all the 'innocent mistakes' in its design. Lacer is a series of threads, motors and moving arms mounted on Perspex. 'I designed the robot to control threads – it can pleat

THOMSEN

KNITS, WEAVES AND SEWS THE BUILDING SKINS SHE DESIGNS.

STRANGE METABOLISMS
METTE RAMSGÅRD THOMSEN,
CITA AND TONI HICKS, UK
PHOTOS ANDERS INGVARTESEN



them and un-pleat them. I thought of it as Penelope of the Odyssey – weaving and unweaving, again and again, as she waits for Odysseus.'

Thomsen is interested in the narratives of interaction, the relationship between material and making, and in the underlying logic of materials. For the past three years, she and Toni Hicks – a fashion designer and knitwear researcher at the University of Brighton – have been investigating CAD CAM knitting using composite materials such as carbon fibre-reinforced Kevlar. 'She taught me how to knit on a Dobier machine,' Thomsen says of Hicks, 'one of those analogue knitting machines that everyone used up until about 20 years ago. Even now, when you buy a complicated knitted sweater with a loose stitch, it could have been made on one of these. So I learned how to knit, stitch by stitch.'

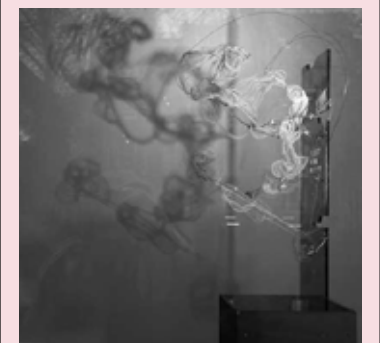
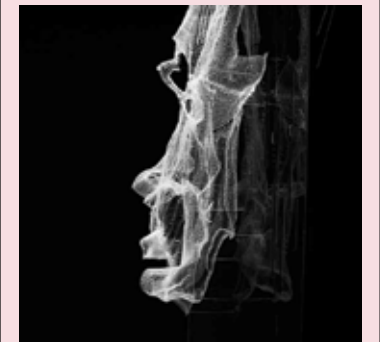
This know-how is useful in CAD CAM knitting as well. 'While it is computer controlled, you need to have a real knowledge of the tectonics of the material,' she says. 'It's about hyper-resolution; with each stitch you can control what that stitch is doing, because when you work with textiles, the material performs in all sorts of ways. You can spin wool tightly or loosely. It can be elastic and movable, but it's still the same material.' She says that architecture – usually some combination of materials such as wood, steel, stone and glass – 'can be very diagrammatic in its approach to material, whereas textiles feature an embedded knowledge about performance that demonstrates the relationship between craft and material.' With Hicks, Thomsen made Strange Metabolisms in 2007, a series of models developed with the use of CAD CAM knitting. 'The project

shows how we can make soft skins for the built environment – the dream is 1:1,' she says. 'Maybe in the future someone will say, "Can you knit this wall for me?"'

About three years ago, Thomsen attended a workshop conducted by Joanna Berzowska, a Canadian designer from Concordia. 'We looked at shape-memory alloys and architecture,' she says. Berzowska, who holds degrees in mathematics and fine arts, is known for her pioneering work in electronic textiles, also known as 'smart fabrics' or 'wearables'.

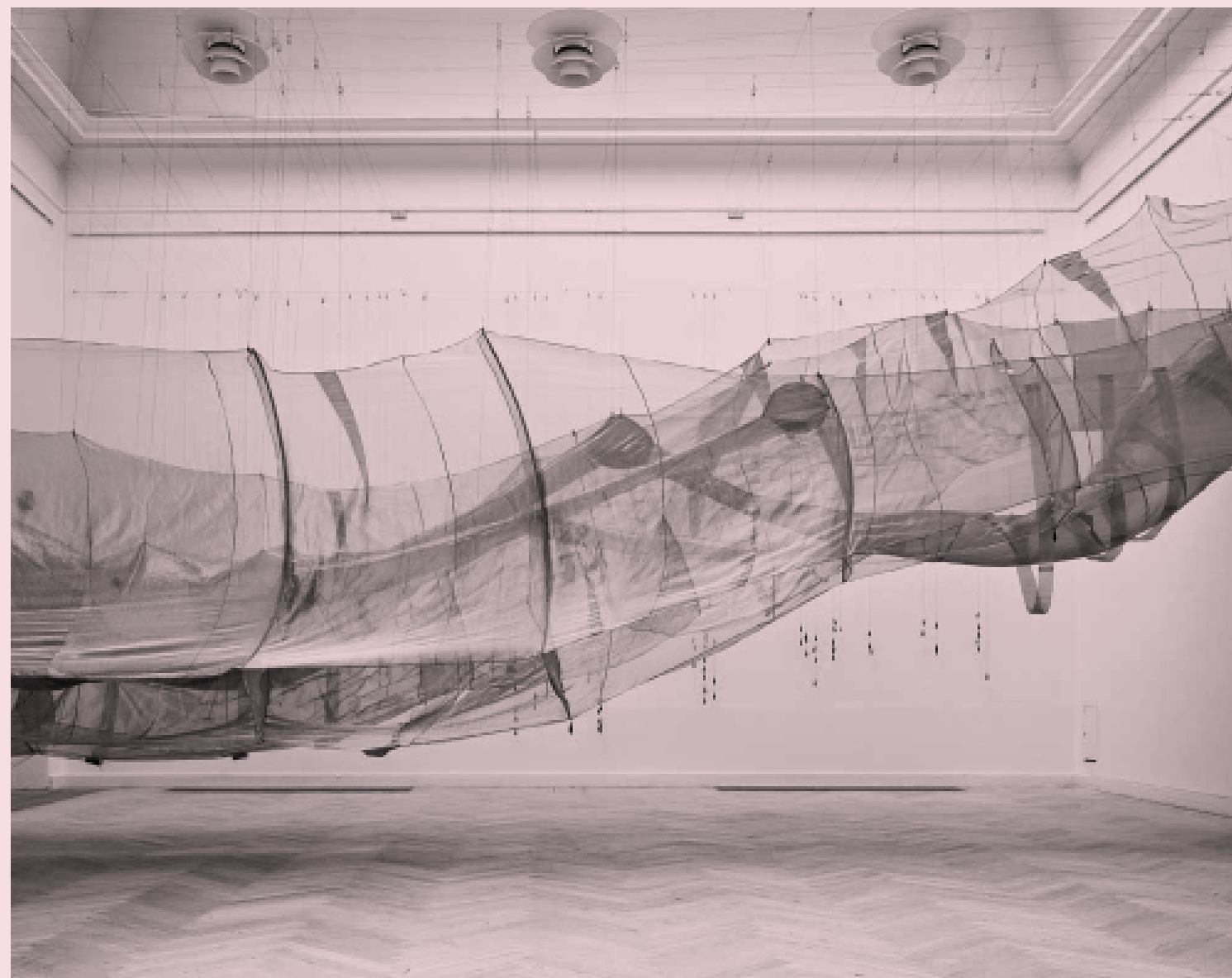
'It used to be this field where men would strap computers to their arms and wear big goggles, but Joanna's wearable designs are not like that at all,' she laughs. A recent project by Berzowska uses biometric sensing technology that senses the user's emotions on its inner layer and projects them onto the outer layer.

Text Terri Peters



'It is a dress that can blush,' says Thomsen. 'After Joanna taught me about soft computing, I made Vivisection, which takes the principles of soft computing to the scale of a space. I thought it was going to be a project about interaction, but it ended up being about pattern-cutting and tectonics – and it led to all the research I've done since then.'

From Vivisection, she moved on to Slow Furl, which was exhibited in Brighton last summer. Here Thomsen used pattern-cutting techniques to construct an undulating fabric wall: an interactive-textile installation that scrunches and unfolds extremely slowly. Lit from behind, a soft, white membrane seems to creep almost imperceptibly across and up the walls on a series of long wooden arms operated by means of microcontrollers. The glowing wall responds to movement in the foyer and to user »



VIVISECTION
METTE RAMSGÅRD THOMSEN, CITA
AND SIMON LØVIND
 PHOTOS ANDERS INGVAERTSEN

‘I learned how to knit, stitch by stitch’

— Mette Ramsgård Thomsen —

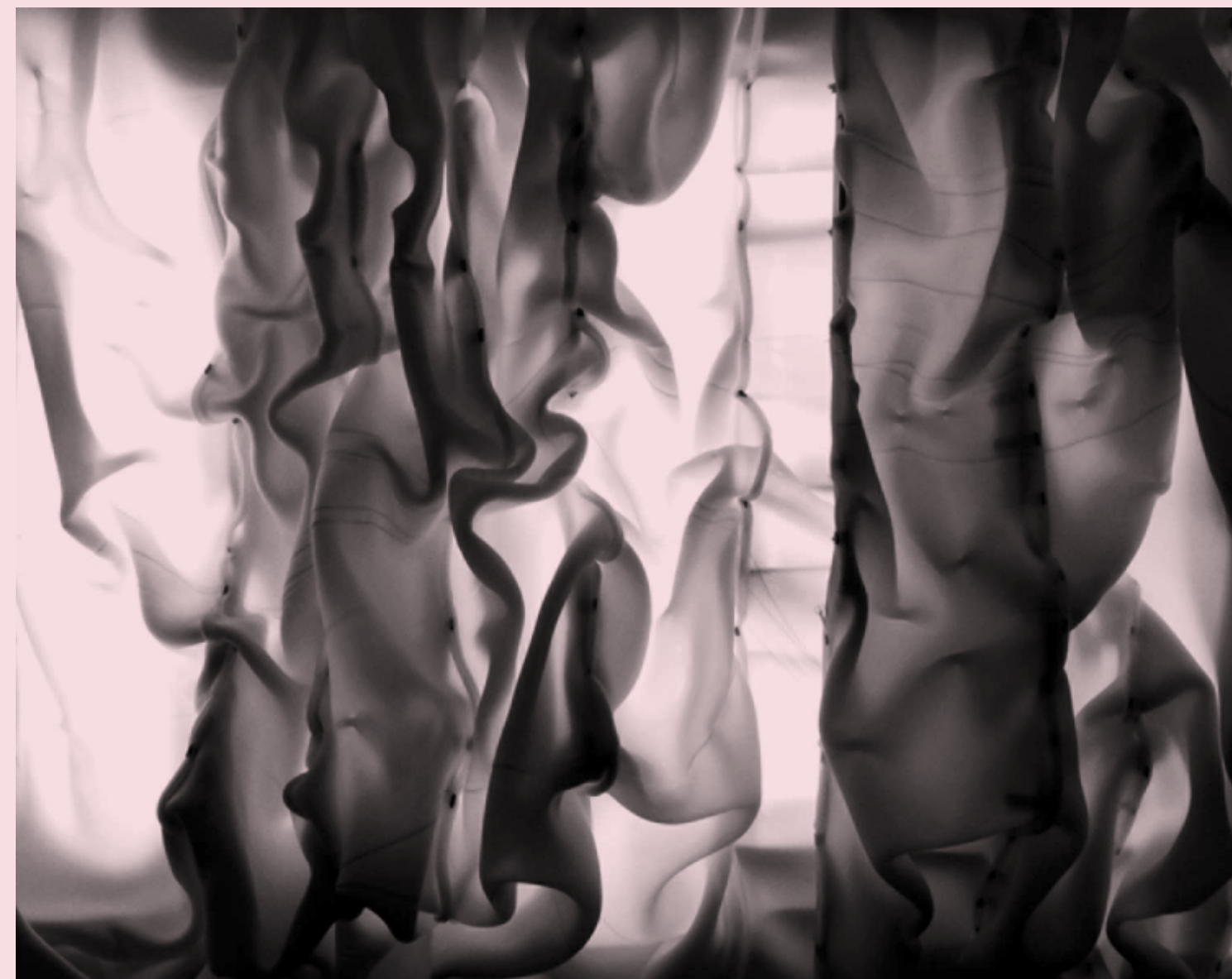
engagement: visitors sit on it, touch it, lean against it. The result of a competition she won, the installation became Thomsen's opportunity to imagine what it would be like to live in a soft space and to think about how time works in relation to scale.

‘I wanted to discover the pulse of the building. How should it move, and at what speed? The project is about glacial time, the time frame of a wooden roof flexing over the summer, and my perception of it,’ she says. ‘The material is from Devon, and we had it laser-cut and stitched at a sail-cutting workshop in Fareham, England. Sail-makers are used to cutting large pieces of canvas. Slow Furl is made of digitally fabricated slices of a long length of material, and the slices are sewn together in a very precise way.’ The installation highlights the properties of the knitted spacer fabric – a high-spec,

non-laminated composite that feels a bit like firm foam. ‘With a textile, you can just add stitches, make it bulge or move. It’s about getting that sensibility into the material, about conveying tactile information on its performance.’

The newest completed project, devA, also investigates how to design the material performance of an object while incorporating ideas about natural form-finding into the fabrication process. The name ‘devA’ comes from the mathematical description of a cone. Thin stainless-steel sheets were folded by hand and bent into shape by members of CITA, who were able to create a series of complex forms using nothing but this manual method of joining one sheet with another.

Thomsen finds it ‘impossible to describe the shape. Thinking we could make a 3D model, we tried doing so for about half a year.’ The behaviour of the material and the way



SLOW FURL
METTE RAMSGÅRD THOMSEN AND
KARIN BECH, CITA
 PHOTOS MARK BRYANT



in which it’s manipulated into the final cone shape are difficult to describe in terms of a normal CAD software package. Since there’s no sense of physics, gravity or material strength in CAD, you can’t draw a flat sheet and bend it. Thomsen likens devA’s form to the hull of a ship: it’s a robust, doubly curved shape, despite being made of industrial sheet metal. The series of steel cones were hung from the ceiling like glistening disco balls at the Copenhagen Distortion music festival in June 2009. This project illustrates how CITA uses parametric design, digital tools, material know-how and textile-related logic to create experimental designs.

Currently, Thomsen is working with other members of CITA on prototypes for It’s a SMALL world, a room-in-a-room installation to be exhibited at the Danish Design

Centre this autumn. Comprising an exhibition platform, seating and a ceiling, the project is to be used by visitors to the gallery. ‘The brief asked for a system based on fractal logic and engaged with scale, so that elements could grow seamlessly into one another,’ she says. The material is aluminium-and-plastic sandwich panels. ‘There’s no substructure; it is a pure skin, 100 per cent recyclable and light. I can actually carry one of these components!’ The prototype is outside under a tree at CITA, in a grassy courtyard between buildings that once functioned as a military barracks. They currently house the academy’s architecture, theatre, film and music schools. ‘There are ten diamond-shaped pieces, from the size of a table to that of a 6-m-long wall, arranged in a hexagonal grid,’ she explains ‘It is a recursive logic; they all pack into each other for ease of

transport. We developed a bespoke parametric design system to create them, and we used mass customization and digital fabrication.’

Thomsen’s multidisciplinary ambitions and expertise refer to an understanding of how things are made and to the relationship between digital and physical, as well as craft and material. But are these ideas part of a wider trend in architectural thinking? ‘I believe the concept of digital crafting is a new challenge for the built environment,’ she says. ‘It’s about how we think about architecture, beyond a formalist, material-based approach. It’s not only about making things, but about teasing out a material logic – that’s how we can establish new architectures.’

From her light-filled harbourside studio, strewn with half-finished, variously sized models – from small colourful cardboard mock-ups to »



IT'S A SMALL WORLD
METTE RAMSGÅRD THOMSEN AND
MARTIN TAMKE, CITA



large, sagging, 1:1 wood and textile prototypes – Thomsen works with her team to make the final adjustments to a digital model scheduled to be sent for fabrication. It was due yesterday, and everyone is working furiously. At CITA, every surface is covered with papers, drawings, models (some hanging from the wall), sewing machines and dangerous-looking, folded-steel off-cuts.

As I leave, Thomsen returns to the heart of it all, eating an apple at her computer while furiously clicking with the mouse. Obviously, she couldn't be happier. In a wider context, Thomsen's youthful and open-minded approach has cemented her place as a rising star within Denmark's academic architectural scene. Quirky and personable, she has forged collaborations with industry, with big international names such as Gehry Technologies, with up-and-coming MAPT Archi-

tects in Denmark, and with other international research institutes – a recent coup being Melbourne-based architect Mark Burry, who will become the school's visiting professor in the autumn.

In contrast to the often-severe austerity of Danish design, Thomsen's hybrid approach and experience is imbuing the discipline with both new energy and new technologies. Visually focused and fun, her take on computation and digital design is about curves, interactivity, texture and light. CITA's ambitious practice-based research relates to computation, fabrication and design in a way that is truly experimental. Now in its fourth year, CITA may be too new to be a model for the academic research group of the future, but it is well on its way. «

cita.karch.dk



DEVA
METTE RAMSGÅRD THOMSEN,
MARTIN TAMKE AND SERDAR ASUT,
CITA, IN COLLABORATION WITH MAPT
 PHOTOS ANDERS INGVAERTSEN

'Digital crafting is about teasing out a material logic'

— Mette Ramsgård Thomsen —

