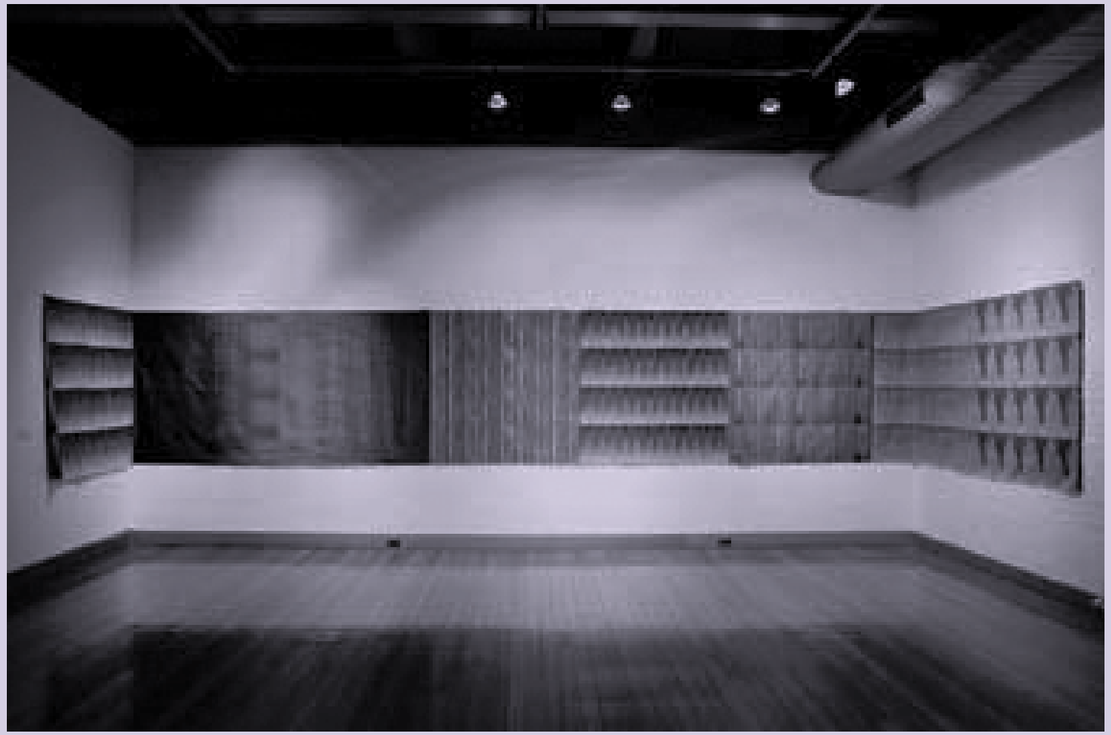
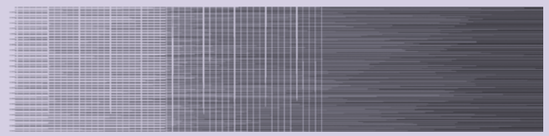
JENNY SABIN

Text **Terri Peters**
Photos **Jenny Sabin / LabStudio**





DRAWS CONNECTIONS AMONG COMPUTER SCIENCE, ARCHITECTURE AND CELLULAR BIOLOGY

Developing architectural applications beyond the standard floor, wall and roof is something 34-year-old artist, architect and educator Jenny E. Sabin accomplishes through an open-minded, multidisciplinary approach. As the cofounder of experimental research and design group Sabin+Jones LabStudio at the University of Pennsylvania (Penn), the young designer is esteemed for drawing connections among sculpture, weaving, geometry, computer science, architecture and, notably, cellular biology. Recently it has become almost fashionable for architects to find influences in natural processes, living systems and other biological phenomena, but without proper collaboration, the results are merely aesthetic. Sabin's work and ethics have led her in the direction of cultivating vast scientific knowledge and working partnerships in lieu of the superficiality of form. 'Scientists can produce so much data, to the point where designing different filters becomes necessary in order to visualize the data with the utmost clarity.' She goes on to say that 'using these filters allows us to analyse complex relationships in the body, mathematics and biology that have implications for multiple fields, including architecture'.

Sabin and LabStudio's other founder, cellular biologist Dr Peter Lloyd Jones, have employed a team of mathematicians, material scientists, architects and cellular biologists to continue their research on filtering data sets. Currently, the team is being funded for the diagnoses and treatment of pulmonary vascular disease in 4D, using sight and sound.

The pairing of Sabin and Jones was as unscientific as it gets. According to Sabin, the prospective founders of LabStudio met by chance. 'In 2006 he walked by a sign that described our workshop at the architecture school. The sign mentioned my involvement in the Nonlinear Systems Organization (NSO) and being a nonlinear systems biologist, he decided to come along.' Although university campuses are filled with diverse groups of students and professors interested in learning, rarely do they attend each other's conferences. 'It was serendipitous,' she says. 'He stayed for the whole thing, and at the end he handed me his card and said, "I really want to talk to you."'

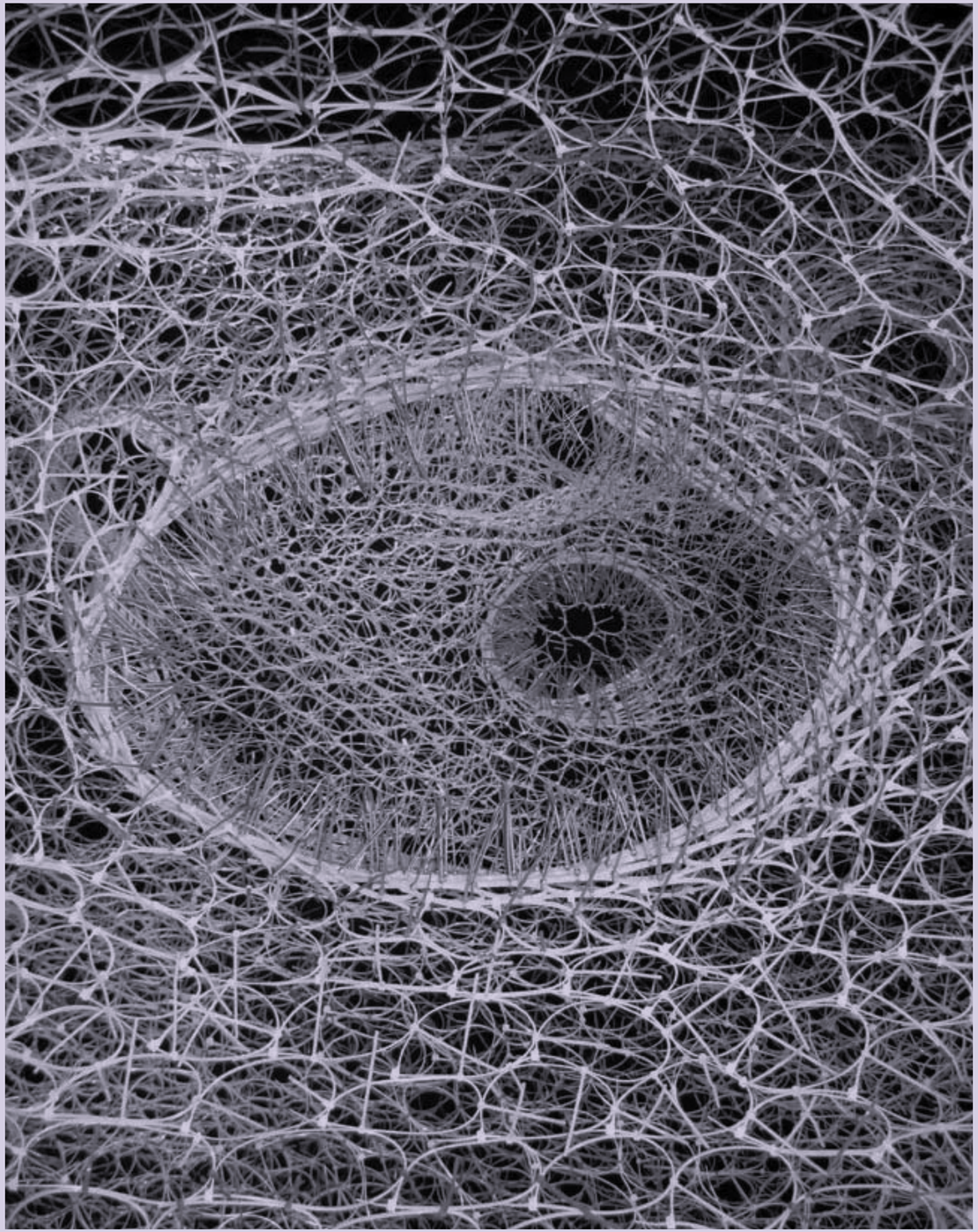
Jones, the director of the Centre for Pulmonary Arterial Hypertension Research at Penn's Institute for Medicine and Engineering, could see the potential for collaboration between his activities in the generation and analysis of dynamic 3D tissue systems and the work being carried out in Sabin's architecture studio. Sabin was amazed. 'I thought, wow, I could actually make a difference in a field other than architecture.'

After the encounter with Jones, Sabin became a member of the Institute for Medicine and Engineering, a historic event as she was the first person to be admitted to the body who did not have a formal scientific background. Nonetheless, Sabin has not let her art- and architecture-specific education discourage her from addressing the institute's computer programmers and engineers with ease. She is just as comfortable speaking to scientists as she is talking to the art curators at Ars Electronica, the venue in Linz where she is exhibiting an enormous room-scale sculpture entitled *Branching Morphogenesis*.

Perhaps Sabin's fearless collaborative approach is the result of her background as an artist, which demanded years of education based on making and doing. Before studying architecture, Sabin honed her skills in material research and crafts with a degree in ceramics. 'I ran a ceramic arts studio for five years in Seattle, slip-casting and glazing mass-produced objects and customized moulds. I was a bit overwhelmed, however, by a restriction-free practice that allowed me to do almost anything.' Much of her work at that time was inspired by architectural and scientific concepts, but a desire to find ways to guide and structure her work led her to enrol in architecture courses at Penn. Sabin candidly admits she needed 'parameters and constraints', adding that » 'my studies at Penn were cross-disci-

Fourier Carpet
Jenny E. Sabin
2006

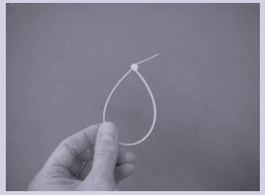
Fourier Carpet is an 11-m-long wool tapestry based on the Fourier series, a binary mathematical sequence used for measuring sound. Through the design of this object, Sabin aims to visualize abstract data and to explore ideas inspired by computer code, weaving and mathematics to create a textile that relates to architectural scale.



Branching Morphogenesis

Jenny E. Sabin with Andrew Lucia, in collaboration with Peter Lloyd Jones and the Sabin+Jones LabStudio, University of Pennsylvania
2008

Branching Morphogenesis is an immersive environment that allows visitors to walk inside a 'datascape' that Sabin and Lucia designed to materialize five slices in time that capture the force network exerted by interacting vascular cells upon their matrix environment. In the sculpture, time lapses are constructed as five vertical, interconnected layers made from over 75,000 plastic cable ties.



'I visualize information that is not possible to see with the human eye'

— Jenny Sabin —

plinary in terms of art and architecture, but if someone had told me by the end of my architecture training I'd be designing with computer code . . .'

Sabin notes that a great deal of her early inspiration came from attending a lecture by the influential London-based structural engineer Cecil Balmond, who has, in her words, an 'almost mystical' relationship with geometry, form and material. Little did she know that she would eventually be part of his design studio and teach algorithmic design courses with him at Penn. 'He's been a tremendous mentor; some of my early ideas about weaving came from studying with him.' After establishing the Nonlinear Systems Organization at the university, Balmond was joined by his mentee, who is now a senior researcher.

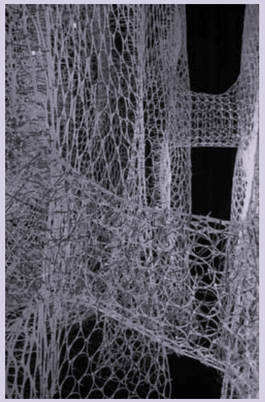
Her first realized project based on weaving research developed with Balmond was the *Fourier Carpet*, an 11-m-long wool tapestry woven on a Jacquard loom. 'There is a historical and conceptual link between computer code, geometry and weaving,' says Sabin, explaining a theme that clearly resonates in her work. The *Fourier Carpet* builds conceptually on an earlier project, *Body Blanket*, which derived its form and material from patient data sets that originated in a hospital setting.

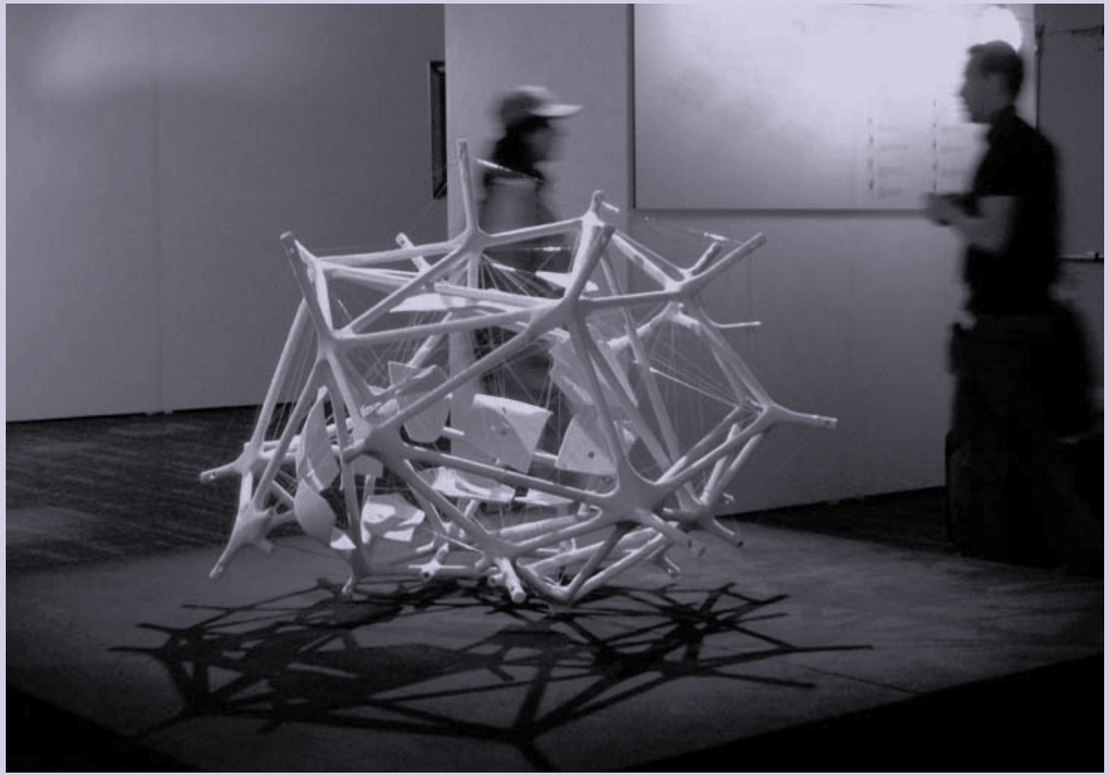
'It was about generating a personalized interface through the materialization of dynamic personal data sets of the body.' To construct the tapestry, she abstracted the mathematical Fourier code to generate a CAD file of binary block code, which she then fed into the digital interface of the Jacquard loom. 'These ways of thinking, of relating to new structures and adapting to new relationships, are what I've brought to my collaborations with Jones and LabStudio.'

The style of teaching that Sabin experienced during her years as an architecture student helped her to establish a working precedent that has been invaluable. 'At Penn, I learned an algorithmic approach to problem solving,' she says. 'It's a bottom-up, systems-based approach to design.' She was able to find common ground with Jones in this way. 'In our collaboration, the first thing we architects did was to create custom algorithms to filter data sets, and then we generated 3D digital and parametric models.' She says the scientists 'were amazed', as they had not been using visualization methods to 'see' their data in this way. Sabin and her students had not realized their studies would make such an impression on their new colleagues, since creating models and visualizing data is a normal part of their work. Prepared to be in awe of the scientific process, Sabin recalls 'being blown away at times by what they *weren't* doing'.

One of Sabin's architectural and material responses to these studies is her *Branching Morphogenesis* project, which visualizes the data set and key structural relationships of networking lung cells. 'It is a productive piece for both science and architecture, because it visualizes information that is not possible to see with the human eye. It's the gestalt notion of bringing "cellness" into tangible, scalable scenarios to allow new ways of reading what is there.' Made almost entirely of 75,000 plastic zip ties, the enlarged network of lung cells is an impressive handmade sculpture and the only analog project on display in the Linz exhibition. Designed with Andrew Lucia and in collaboration with Jones and LabStudio, the project required teams of students for its realization; they tirelessly tied and clipped the plastic loops before the installation was shipped to Linz.

The choice of ready-made materials, such as plastic zip ties, creates »





a quirky and playful aesthetic with an element of surprise. 'If we had laser-cut loads of different parts, it wouldn't have had this aesthetic,' says Sabin. The result is a flexible, remarkably low-tech, temporary environment that appears to flow and drape like fabric. Even more remarkable is the fact that the project enlarges something tiny and commonplace – the human cell – and makes the beautiful, innate intricacies of cells visible for the whole world to see. 'Each of these points of intersection is a data point; it is an idea about a model as an interface. I wanted to address issues of scale and to reintroduce the body into the analysis of communication and data.'

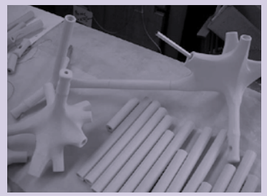
Sabin's formal and relational studies and digital tools are starting to be tested as ideas for tangible, scalable architecture. This past summer she presented her latest LabStudio work, a project strongly influenced by her training in ceramics, in combination with experimentation in textures and materials. The installation, which appeared at Siggraph in August 2009, uses rapid prototyping technologies to create ceramic objects with architectural scale in mind. 'Through a new collaboration with mechanical engineer Mark Ganter, we've figured out a way to print ceramic material that bypasses the moulding process.' The work builds on the surface-design track of her research with LabStudio, in which she explores the multi-cellular structure of the human mammary gland. The final product is approximately 1.5 m in both diameter and height. Composed of 140 individual, mass-customized parts, it is a study of abstracting parametric relationships and structures. A series of thin cables acts as a secondary structure for the rigid component system. 'I see it as a structural model that exhibits the key relationships we saw in the scientific model. As we work with different materials and try to understand their structures, we're optimistic about what we can learn. We hope it will lead to a real structural system and, eventually, to an architectural, scalable model.'

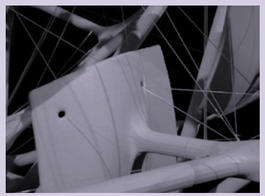
Teaching at the architecture school and encouraging collaborative learning beyond her own work arevital aspects of her cross-disciplinary practice. 'I co-teach an elective at PennDesign that pairs scientists with graduate architecture students. Together they develop tools and simulations. They develop abstract models based on observations, simulations based on performance, and digital tools that allow them to generate 3D prototypes using rapid manufacturing solutions like 3D printers as design tools. The larger agenda is to understand how buildings can become more biological and can interact and adapt to their environments.' She stresses, though, that the point of her work is not to turn architects into scientists or to convince scientists to become architects. She believes high-level research should welcome collaboration across disciplines and that researchers should find a common language to communicate.

So far, however, Sabin has managed to resist translating her research with LabStudio into 1:1 architecture. She has no interest in constructing cell-shaped buildings or using computer code to adorn façades. 'A direct translation of the work we're doing would turn it into a one-liner, not to mention the ethical issues involved.'

'As a designer, I'm working on really important issues like breast cancer, but at the end of the day my heart is in making and materials. The architectural avant-garde has given us a slew of architectural examples, of new formal possibilities and material directions for architecture, but as architects and designers we have a responsibility to move beyond shape-making.' Considering form in its context, Sabin and Jones are using biology as an ecological model for architecture. 'We need to understand how context or environment specifies form, function and structure,' she says. 'We are experimenting – looking at new models that relate to energy conservation, adaptability and performance in architecture.' «

www.jennysabin.com

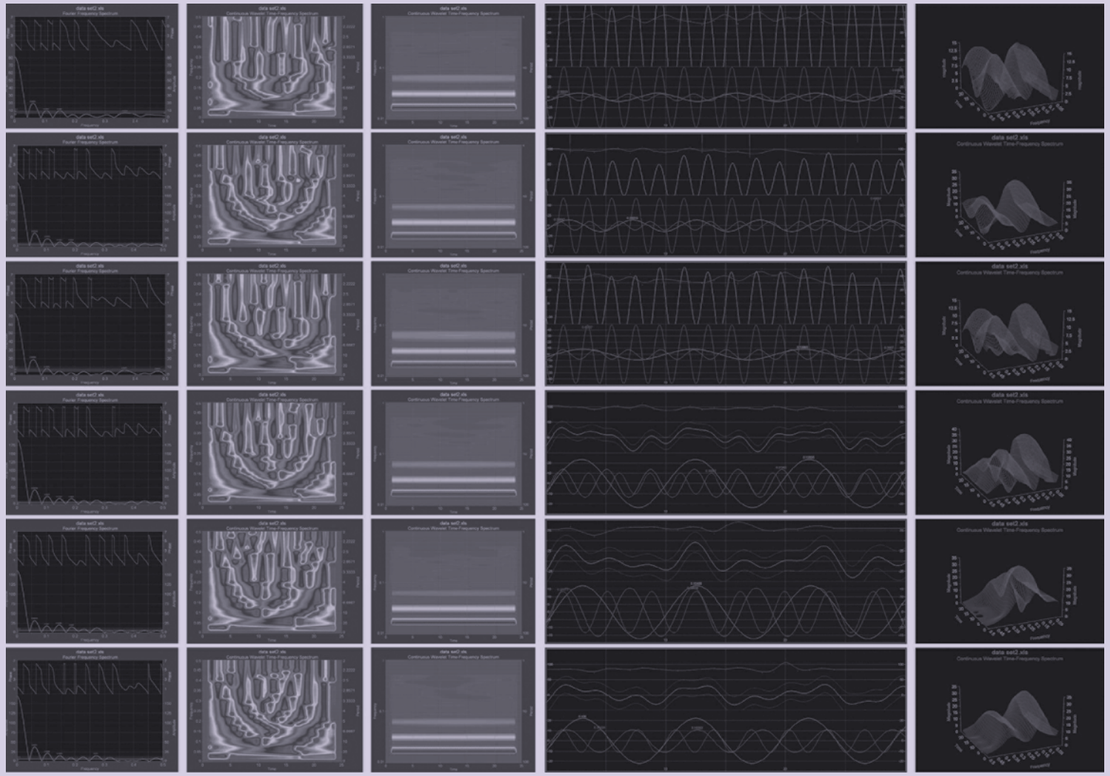




Ground Substance

Jenny E. Sabin with Andrew Lucia, in collaboration with Peter Lloyd Jones and the Sabin+Jones LabStudio, University of Pennsylvania Production Team: Rebecca Fuchs, Emily Bernstein and Kara Medow
2009

Exhibited at the Siggraph Design and Computation Galleries in 2009, Ground Substance uses rapid prototyping techniques to 'print' 140 individual, mass-customized ceramic and plaster parts. The sculpture is a study of how abstracted organic models can raise questions about how using unconventional ways of understanding issues of feedback, growth, and self-assembly can create innovation in architecture.



Body Blanket

Jenny E. Sabin
2005

Using personal data sets, Sabin aims to 'reintroduce the body' into the communication between patients and doctors. This research could potentially relate to architecture and the hospital setting, giving form and material to the information.