AGILE SPACES

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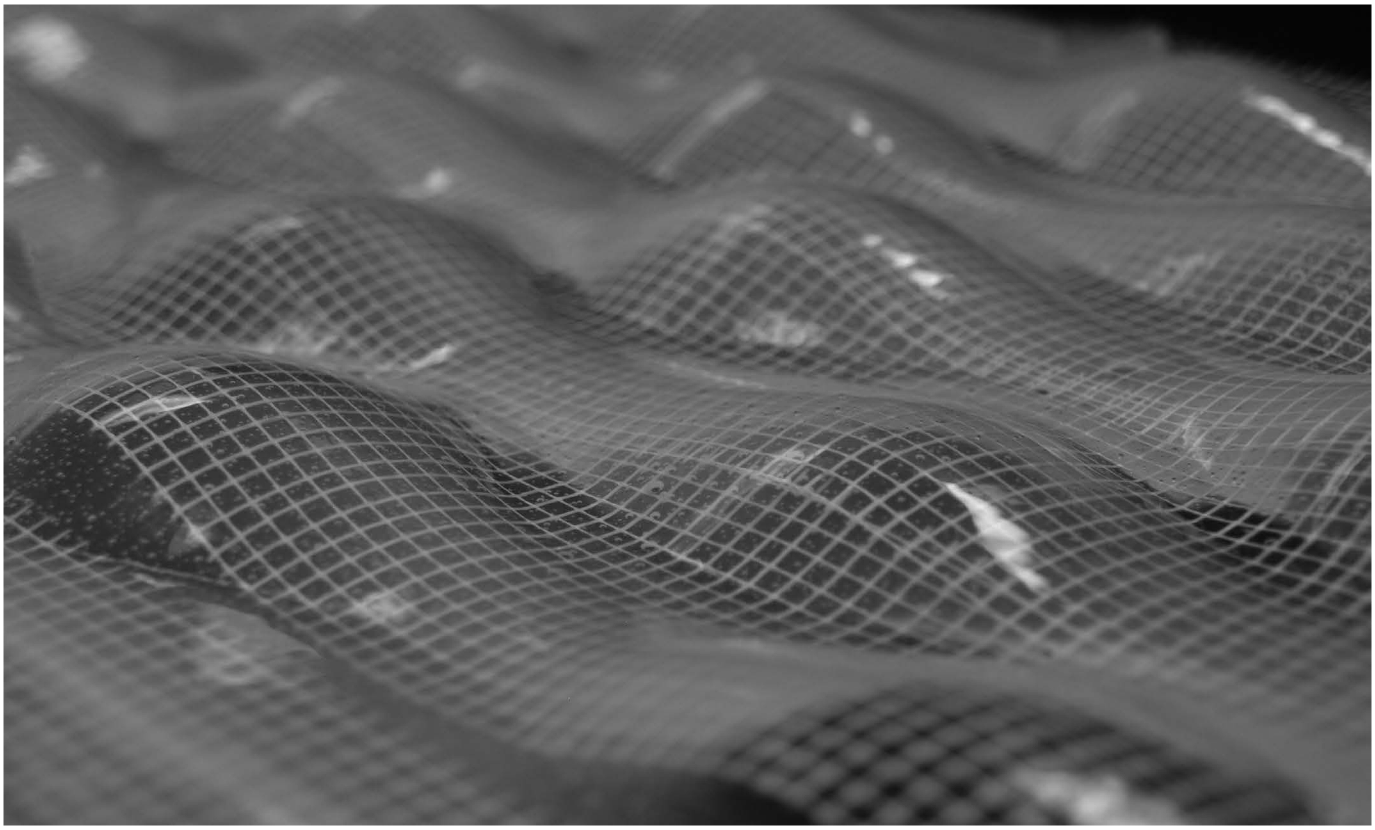
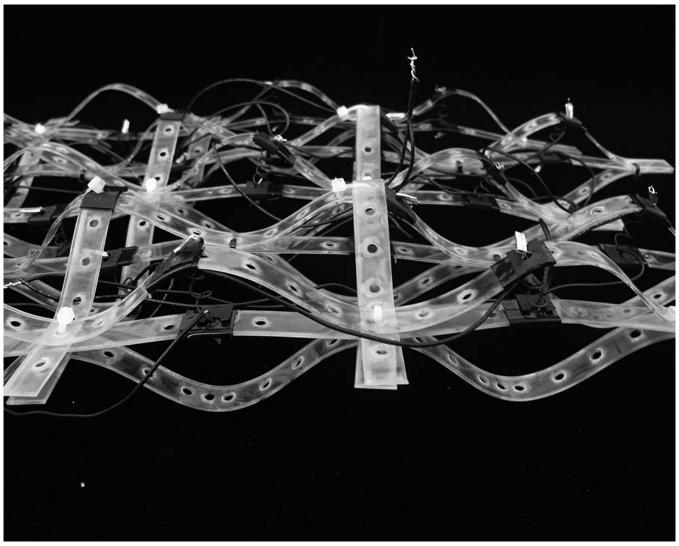


1 Lattice surface studies

Behavior, adaptation and responsiveness are characteristics of live organisms; architecture on the other hand is structurally, materially and functionally constructed. Natural systems use adaptation to adjust to and to compensate for constantly changing environments that surrounds them. Through their productive relationship with the environment there is constant exchange of matter, energy and information. Adaptation and responsiveness of the constructed environment is not easily achieved. The challenge, in part, stems from the way we build and from the hierarchical and top down nature of design process. The project presented here is driven by an interest in adaptive systems in nature and informed by material variability and structural hierarchy of the naturally constructed materials.

This ongoing research project proposes an adaptable and responsive material system capable of sensing its environment and responding by revealing small occupiable spaces to the passersby. The backbone of the project is a kinetic material system (Figure 2) activated with non mechanical actuators (shape memory alloy) that utilizes a differential cell lattice structure and its structural behavior. The lattice itself is not designed as a kinetic structure with movable joints. It becomes kinetic when the shape memory alloy springs are activated. Activation of the springs produces tension in the lattice members that cause change of geometry of the lattice cells. This change triggers the movement curving the lattice. The principle is similar to the process caused by turgor pressure in the plants' cells where the change in pressure within the cell changes its volume and causes movement. Variation in the lattice cell size changes the amplitude of the deformation producing differentiated movement and therefore variable curvature of the lattice. This variable cell size also produces variable thickness or cross-section of the system's structure. The thicker regions have larger deformation amplitude and "structure" the space around forming the pockets of space that with adequate scale of the surface could be occupied when activated. The surface is activated by registering personal mobile devices and duration of their presence in its proximity. When activated the structure gently moves up offering a shelter, privacy or passage.

In his book An Evolutionary Architecture, John Frazer suggests a new form of designed artifact: one that is interacting and evolving in harmony with natural forces, including those of society (Frazer 1995: 10). This architecture depends on information transfer. The relationship between information and physical response of an adaptive structure is supported by application of actuators as well as mechanisms that control and activate the intelligence of physical environment. The agile spaces of the proposed project would provide shelter and mediate temperature environment making public spaces in the harsh (cold) climates more vibrant. The "intelligence" of the surface's physical environment is capable of incorporating climate conditions and human related conditions into its working. By sensing the environmental temperature the surface can provide localized heated regions. These regions can also act as attractors that draw people in or around. The surface can also sense the presence of people and start to adjust its surface temperature as needed or it can move to reveal occupiable sheltered space. The heat generation of the surface is closely related to the movement of the surface. When activated shape memory alloy generates heat. This heat is captured, stored and moved through the surface, in other words it can "follow" movement and activity of people.



2 Uniform Lattice

WORKS CITED

Frazer, John.1995. An Evolutionary Architecture, Themes VII, Architectural Association, London: 10.

VERA PARLAC is a registered architect in Pennsylvania, U.S. and an assistant professor at the Faculty of Environmental Design at the University of Calgary. She received a diploma engineer in architecture degree from University of Belgrade and master's degree in design from UCLA. Vera Parlac is one of the founding co-directors of the Laboratory for Integrative Design (LID), a design research laboratory where design is engaged as a broadly integrative endeavor by fluidly navigating across different disciplinary territories. Vera's current design and research is focused on responsive material systems and informed by contemporary models in biology, material science research, and mechatronic systems. Prior to her appointment in Calgary, she taught design and other subjects at several universities in North America, most recently at Temple University, and in Asia, in Hong Kong. Vera has worked in architectural firms in Philadelphia, Toronto, Boston, Miami, and Los Angeles including Carlos Zapata Design Studio and Kieran Timberlake Associates.