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Kinetic Weaving

Participant info

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Project info

Inspired by Renzo Pianos Traveling Pavilion designed for IBM in 1984 we started to develop a pavilion of our own. With distinction to Renzo Pianos „Traveling Pavilion“ which was part of a touring exhibition we developed a principle that is collapsible and could be build in different places around the world out of various materials. Unlike the structures by Chuck Hoberman, which obtain their collapsibility by the means of two-dimensional shear joints our structure is based on the three-dimensional weaving of sticks to produce a collapsible joint. We systematically discovered the geometric principals which underlie this three dimensional weaving technique. Build on the discoveries of the analysis of one separated element we analyzed this element as part of an interconnected system. Doing this, we observed two different possibilities of connecting multiple elements together. Whereas one version allows for a greater variety of different shapes but needs an additional flexible joint the second version enables a simple linear connection of multiple elements.

Aiming to achieve an affordable and simple structure we developed a digital design tool on the basis of this simple linear connection. Any free form surface could be developed into a system of collapsible joints. Based on the length of the material the tool calculates the number of elements needed. We have used over 5000 recycled bicycle spokes as a free building material. With these 240 mm long sticks we have designed an prototypical pavilion to examine how the structure reacts as a whole. For the connection of the elements we used heat-shrink tubing. Beside weaving the elements by hand, we implemented the assisted production of one element with the help of an LBR iiwa 7-axis robotic arm. The finished pavilion consisted of over 10.000 individual parts and was exhibited at the robots and art festival „Robodonien“ in Cologne.

