

## Exploration of Connecting Artifacts - Polyhedra, Weaving, Scissors structures

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**Abstract:** I will present my research activities and works that originated from the exploration of shapes.

My research began with a study of the family of polyhedra obtained by folding a tetrahedron along regular triangular grids. These polyhedra can be decomposed and unfolded into one or multiple bands. This interesting property led to new works using Kagome weaving, Kumihimo braiding, and zippers.

The shear deformation of a tetrahedron by biaxial weaving inspired the study of deployable surface mechanisms using bending-active scissors structures. This mechanism combines multiple scissors made of elastic flat members. They become 3D curved surfaces due to the incompatibility of the in-plane deformation of each unit, and transform smoothly with no play in the pivot hinges. By focusing on the in-plane extension and contraction of the scissors' transformation, we can understand the motion and compatibility of the scissors' units. I will introduce the design method and examples of physical prototypes of polyhedra and curved surface that can transform from a flat state to a target shape.