Origami is a joyful craftwork and one of the oldest traditional hand based works. Origami, meaning “folding” and “paper,” requires people with profound knowledge about the properties between paper and structure. These people anticipate the three-dimensional outcome way in advanced. However, visualizing origami’s anticipated outcome is very difficult until it is folded. In the Formative Tectonic Screen project, we will illustrate the advantage that can be achieved by applying computation to Origami. By doing so, we can easily manipulate surface plans by applying computation design and see how 2D origami plans change into 3D objects in real time simulation. Furthermore, we will show how we overcame the material limitation in origami by using unconventional materials.
The idea of Origami or folding materials became an inspiration for the project as we explored the performance of the technique with different material alternatives. We endeavored to restructure origami into computational design by using Kangaroo, which is a plug-in for Grasshopper, in terms of prototype fabrication, construction and material system. We analyzed the structural thinking behind origami and put it into digital diagrams that exposed origami’s dependence on shape from base paper. Then, we applied our digital logic to create an origami plan that took advantage of Grasshopper as the parametric platform to bring flexibility to origami logic. The result of the explorations overcame the traditional views and limits of origami materials (paper) and digitized the technique to produce a prototype using digital fabrication and new materials to inform construction techniques. We were able to control the number density of rectangles in plan and the different folding ranges by giving different forces.

In order to overcome the limitation of folding materials, we used large aluminum sheets for the big origami pieces, which is not typical for origami. The properties of aluminum prevent the material from folding like paper due to the lack of flexibility and resistance of tension. We explored the length of the joint dash and node size to pretreat the material in plan. The results allowed us to create a catalog of fabrication settings for different materials, paper, cardstock, museum-board and finally aluminum. To figure out the proper size for the joint dash, we needed to try some different trial tests. Since we got the origami plans in real time simulation, the results come out fast and easily. By applying computation design, people can now control design more easily and have a wide range of alternative design plans.
IMAGE CREDITS
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