Reconfigurable Surfaces

An interesting property of auxetic materials is that with the same piece of material one can approximate various shapes. Furthermore, they can be used as transformable surfaces, i.e., animated structures that can change the geometry over time. Reconfigurable surfaces have a variety of application fields, including the shading and lighting systems in architecture.

Fabrication

Figure 4. We use an efficient alternating minimization approach proposed in [Bouaziz et al. 2012] to optimize the objective function.

Figure 5. Starting from symmetric linkage mesh of cylindrical topology, the user interactively deforms the surface to manipulate the openings of the auxetic linkage to control light flow and shadow patterns.

Figure 6. A free-form facade with uniform equilateral triangles. As the surface is reconfigurable, it can be used as a dynamic external shading system.

Figure 7. Flat cut patterns and final results of fabrication of a doubly curved top, a shoe, and a mask of Max Planck from leather, aluminium and copper, respectively (LGG, EPF Lausanne, 2016).