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Tensegrities: Geometric Structures Suspended in Midair

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Suppose you have a finite collection of points in Euclidean space or the plane. Some pairs are connected by inextendible cables, others by incompressible struts, and some by fixed length bars. The artist Kenneth Snelson constructed several large structures, made of cables and bars, that hold their shape under tension, where the struts appear to be suspended in midair. Buckminster Fuller, the architect and inventor, called them “tensegrities” because of their “tensional integrity”. But why do they hold their shape? There is a very simple principle using quadratic energy functions that provides the key to their stability. I will show a catalog of highly symmetric tensegrities, created with the help of a little bit of representation theory, as well as tangible models, where you can feel their rigidity first-hand.
