



Figure 1: TrussFormer is an end-to-end system that allows users to design and 3D print large-scale kinetic truss structures that deform and animate. TrussFormer verifies that the designed structure can handle the forces resulting from its motion, as shown on this animatronics 4m tall T-Rex.

TrussFormer: 3D Printing Large Kinetic Structures

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ABSTRACT

TrussFormer is an integrated end-to-end system that allows users to 3D print large-scale *kinetic* structures, i.e., structures that involve motion and deal with inertial forces. TrussFormer builds on TrussFab, from which it inherits the ability to create static large-scale truss structures from 3D printed connectors and PET bottles. TrussFormer adds movement to these structures by placing linear actuators into them: either manually, wrapped in reusable components called assets, or by demonstrating the intended movement. TrussFormer verifies that the resulting structure is mechanically sound and will withstand the dynamic forces resulting from the motion. To fabricate the design, TrussFormer generates the underlying hinge system that can be printed on standard desktop 3D printers. We demonstrate TrussFormer with several example objects, including a 6-legged walking robot and a 4m-tall animatronics dinosaur with 5 degrees of freedom.

KEYWORDS

fabrication; 3D printing; variable geometry truss; large-scale mechanism

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