Seminar/Talk

Design and Fabrication of Deformable Structures

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Host:

Digital fabrication allows for an extremely fast transition from virtual prototypes to their physical realization. In the case of deformable objects, one would like to design these prototypes with a clear idea in mind about how they should behave once they are printed. It is not easy to predict what combination of material and geometric properties will produce a specific global deformation behavior. We seek to create tools that simplify as much as possible the way a user specifies the desired behavior and automate the rest of the design process. In this talk we take brief look at the diversity of recent works, identify the fundamental aspects of these methods, and present computational solutions for the design, simulation and fabrication of two interesting kind of deformable structures:

i) We first explore Flexible Rod Meshes. These are light-weight and cost-efficient physical shapes, that can be fabricated in one piece from a single base material, and yet produce deformable objects with really complex behaviors. We present a tool that takes as input a deformable surface together with a set of poses and boundary conditions, and automatically computes a rod mesh ready to be printed.

ii) We then study Kirchhoff-Plateau Surfaces. These are planar networks of thin elastic rods embedded in pre-tensioned membranes that deploy into complex, three-dimensional shapes, composed of minimal surface patches. We propose a tool to interactively explore this intriguing and expressive design space, using a combination of topology and geometry editing, forward simulation, sensitivity analysis and highly efficient inverse design.

In the last part of the talk, we ll briefly take a look at some new trends and promising challenges in the field.

Friday, March 17, 2017 11:00am - 12:00pm

Seminar room Ground floor / Office Bldg West (I21.EG.128)

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