Shape Deformation via Interior RBF

Zohar Levi
Technion

David Levin
Tel-Aviv University

Objective

To animate a 3D mesh, a modeler requires a deformation tool that would enable him to create new natural poses through convenient handles.

Source mesh *Deformed poses*

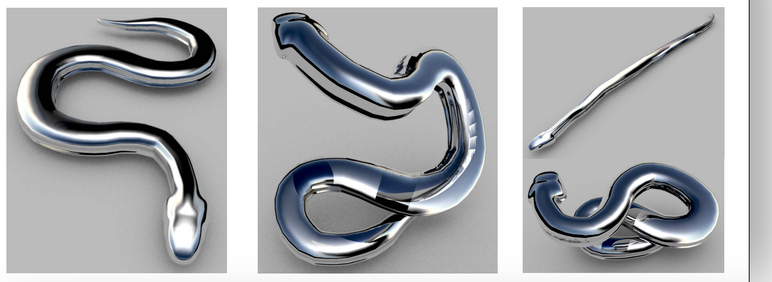
IRBF Properties

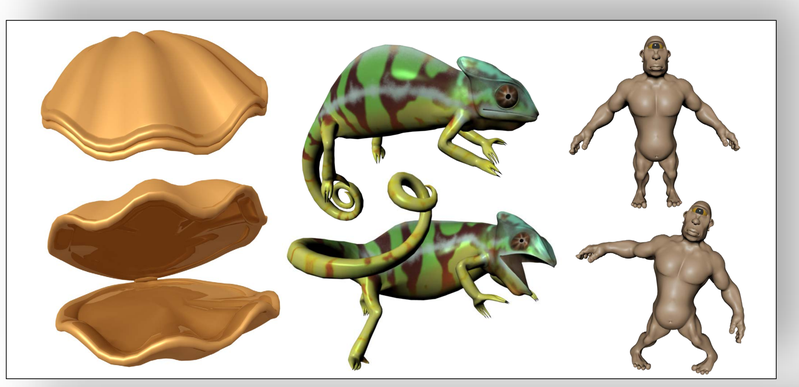
- Our method is a space deformation, i.e. it creates a mapping of the whole subspace, and thus can handle any type of object embedded within, such as the multi-component elf above.
- Enables real-time interaction.
- Has an easy user interface, such that meaningful deformations can be achieved with just a few user constraints. Unlike cage-based methods that require from the user to construct a cage (a well-constructed cage usually involves a considerable amount of manual work), the setup for IRBF is fully automated.
- Respects the interior locality property, thereby enabling localized changes that do not influence nearby branches. For example, manipulation of the right foot of the elf does not influence the left foot.
- Unlike cage-based methods, IRBF can handle touching surface, such as the clam and the chameleon mouth.

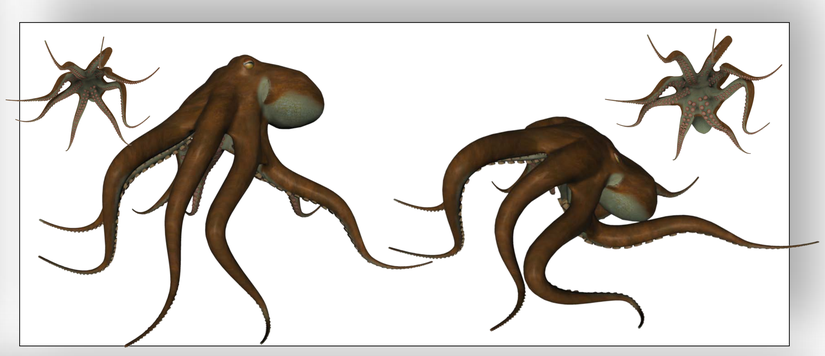
Method Overview

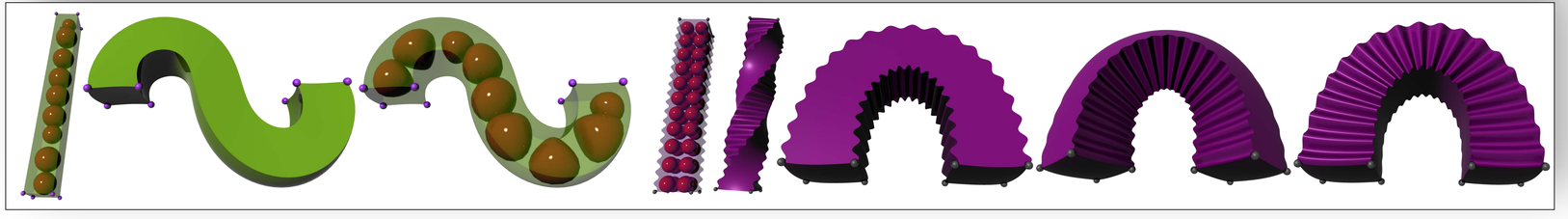
1. The surface of the shape is sampled, and these samples are chosen as the IRBF centers.
2. The shape is automatically filled with spheres.
3. Interior distances are calculated from the IRBF centers to the local rigidity structures that represent the spheres, to the deformed points, and to the anchor points.
4. Using local/global optimization, the coefficients of the IRBF are calculated and the shape is deformed.

IRBF centers *Spheres* *Deformed poses*









Anisotropic scaling