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OctArm - A Soft Robotic Manipulator

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Abstract

Continuum robots are biologically-inspired by the invertebrate organisms such as octopus arms and elephant trunks. These robots with a backbone-less structure offer a superior performance in unstructured and cluttered environments such as collapsed buildings, unknown geographical terrain, holes and tunnels. This video features OctArm, a continuum robot that demonstrates its capabilities in whole arm manipulation, biologically-inspired maneuvering, and grasping. The video also depicts a 3D graphical model of OctArm in that can be rendered in real-time in Matlab's Real-Time Workshop.

OctArm demonstrates biologically-inspired maneuvering abilities such as bending in different directions while holding a basketball, expanding and contracting, and rotating through 360 degrees with the help of a motor attached to the base. Suction devices on OctArm's tip and sides, similar to the octopus's suction cups enable the robot to exhibit various biologically-inspired grasping abilities such as picking up a small ball and lifting a plastic box. OctArm can use the entire length of its arm to grasp objects of different shapes and sizes, termed whole arm manipulation. It wraps its body around the object until it has a firm grip on the object, similar to an elephant using its trunk to move logs. OctArm's ability to grasp balls of different sizes is featured in the whole arm manipulation section.

Therefore this video demonstrates OctArm, a continuum robot performing various biologically-inspired tasks such as using suction cups for grasping, grasping a variety of objects of different shapes and sizes using whole arm manipulation, and demonstrating excellent maneuvering abilities.