

Bio-inspired, Digital-fabricated Soft-bodied Robots

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Designing a robot with flexible/deformable materials, like living creatures, requires us to reconstruct its manufacturing, mechanical design, and control methodologies from scratch.

This is because the existing manufacturing, mechanical design, and control methods have

been optimized to make stiff and rigid robots. Inspired by living systems, we have been

conducting trial and error of next-generation manufacturing using rapid prototyping (e.g.,

3D printers, laser cutters) and printed electronics technology that prints electronically

conductive patterns, sensors, and actuators. This talk presents our trials: Actuator and

sensor that can be inkjet-printed with silver-nano ink; Wireless power transfer technology

that can activate several actuators selectively to alleviate the wiring problem of a soft-

bodied robot; Origami fabrication for soft-bodied robots; Caterpillar-like soft-bodied robot

whose body can be bent and compressed simultaneously, leading to increase of the

locomotion speed; Bio-inspired decentralized control that produces versatile, adaptive

behaviors. We would like to show these case studies open huge design spaces for

roboticists.