

An Intelligent Soft Manipulator Based on Stretchable and Flexible Electronics

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Abstract

Similar to living organisms, soft robots have good flexibility and can interact with the environment efficiently and harmoniously. Despite these advantages, soft robots require embedded sensors for perception and response. However, the movements of the soft robots create large deformation, which make it impossible to apply conventional rigid or non-extensible sensors to the soft robot. Flexible electronics have rapidly developed in recent years. Flexible electronic devices have flexibility and extensibility similar to human skin, and can be useful in the sensing of soft robots. This work presents a soft manipulator embedded with stretchable and flexible electronics. As a kind of soft robots, soft manipulator is very suitable for grasping fragile and complicated objects which is composed of several soft actuators. We improve and design the existing soft actuators, increase the degree of freedom of driving, embed flexible electronic devices in the soft actuators, integrate strain, temperature, and pressure sensors to make the manipulator intelligent and dexterous. In this work, three kinds of signals were respectively tested; we collected the data of the pressure and strain sensors when the soft manipulator grasped objects and then processed and analysed the data. The intelligent soft manipulator presented in this work will make a basic contribution in industries such as food, medicine, and logistics sorting, and has fundamental instructional significance in the sensing of soft robots.

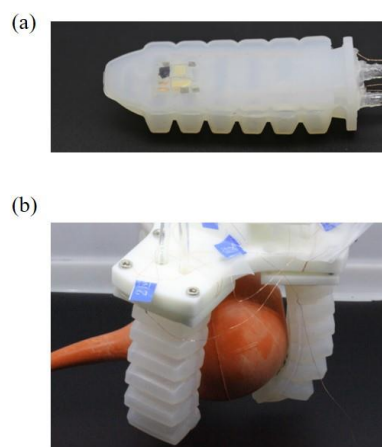


Figure 1: (a)Soft actuator (b)soft manipulator.

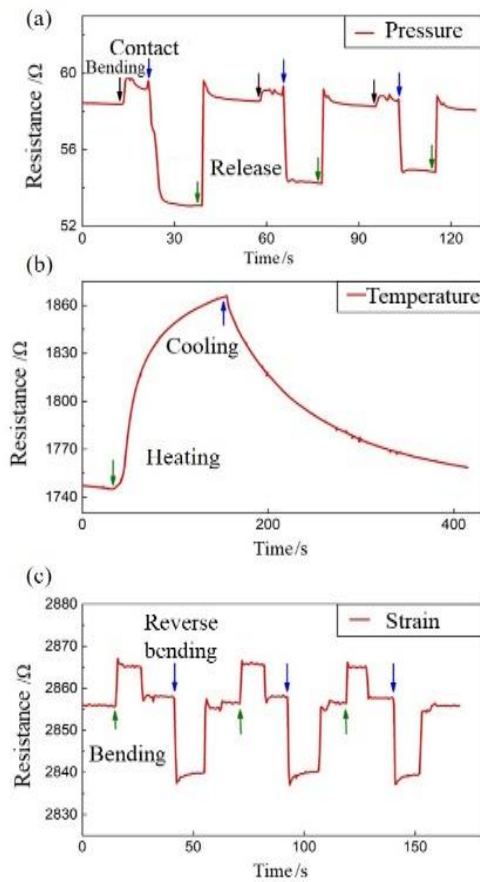


Figure 2: (a)Pressure response (b)temperature response (c)strain response.

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