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Abstract

Performance Evaluation of Direct Printed Flexible Tactile Sensors †

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We developed a direct-printed flexible tactile-sensor-based robotic gripper system for object grasping and experimentally verified the system performance. These flexible tactile sensors are based on pressure-sensing materials that allow pressure to be measured according to resistance change that in turn results from changes in material size because of compressive force. The sensing material consists of a mixture of multi-walled carbon nanotubes (MWCNTs) and TangoPlus, which gives it flexibility and elasticity. The tactile sensors used in this study were designed in the form of array structures composed of many lines so that single pressure points can be measured. To evaluate the performance of the flexible tactile sensor, we used specially designed signal-processing electronics and tactile sensors to experimentally verify the sensors' linearity. To test object grasp, tactile sensors were attached to the surface of the fingers of grippers with three degrees of freedom to measure the pressure changes that occur during object grasp. The results of these experiments indicate that the flexible tactile sensor-based robotic gripper can grasp objects and hold them in a stable manner.

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