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Title: Contact Force Sensing of L-Shaped Structure for Robotic End-Effectors

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Abstract:

Contact force sensing is necessary for robots to safely grasp and improve walking performance. Motivated by the linkage-type geometry of robotic fingers and legs, this article realizes contact force sensing on the L-shaped structure without additional force sensors. The lever-type method of strain exposure (LTMSE) is developed to enhance the force-sensing performance. This method is able to reduce the coupling in three-axis force measurement and improve the tradeoff (between sensitivity and stiffness).

Further decrease of the coupling is accomplished via appropriate strain-gauge arrangement and static decoupling algorithms. The experimental results have demonstrated the force sensing performance of the L-shaped structure and verified the feasibility of the LTMSE for three-axis force measurement. The proposed design has potential applications in linkage-shaped robotic fingers, legs, and probes.

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