A Novel Coupled and Self-adaptive Anthropomorphic Robot Finger with a Dual-oblique-Belt Mechanism

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Traditional spring-tendon-driven self-adaptive prosthesis hand, such as the Stark Hand, uses multiple springs to realize self-adaptive grasping, and uses tendon to drive finger extension. Its grasping force is related to joint angle, and its grasping force is not adjustable, which affects its use effect. My project develops a novel coupled and self-adaptive anthropomorphic robot finger with a dual-oblique-belt mechanism (COSA-DOB finger). The COSA-DOB finger consists of a base, three phalanges, three joint shafts, a motor, a transmission mechanism, two gears, seven transmission wheels, two transmission belts and two torsional springs. The experimental results show that the COSA-DOB finger can achieve three-joint coupled and self-adaptive grasping. In the finger, three joints rotate at the same time, suitable for the accurate grasping of the end phalange. When the proximal phalange contacts the object, the proximal joint stops rotating, and the next joint continues to rotate … until the end phalange contacts the object, so as to realize the force-type envelope grasping of the object. For objects of different shapes and sizes, the finger self-adapts. According to the different positions of the object, the finger can automatically switch between the two modes of the coupling grasping and the self-adaptive grasping. A COSA-DOB robot hand is designed, which has 5 fingers of the same structure and 16 joints in total. It is driven by 6 motors and has a side swing joint between the palm and the thumb. The COSA-DOB hand is anthropomorphic in appearance and movement, easy to control, low in cost and suitable for artificial hand and humanoid robot.