Enhancing grasping abilities through a novel and affordable hybrid exoskeleton glove for hand rehabilitation

Abstract: Over the past few years, interest in wearable exoskeleton gloves has grown. These tools can be used to help those who are healthy or to support those who have neurological and musculoskeletal conditions like stroke, spinal cord injury, etc. The hand, which is the human body's most flexible limb, encounters more difficult problems and recovers considerably more slowly than the lower and upper limbs. In light of these difficulties, a novel therapy called exoskeleton-based rehabilitation has gained increased significance. In this work, we concentrate on creating a wearable exoskeleton glove that is inexpensive to improve the user's grasping abilities. The tool significantly raises the user's gripping capacity, which raises their quality of life. The exoskeleton glove is designed to assist human hands with limited mobility during the motion rehabilitation process and to improve the grasping and dexterous manipulation capabilities of the hands of both impaired and able-bodied individuals. The proposed model consists of two types of systems mainly the tendon driven system and the pneumatic system. The tendon driven system is the system which helps in the flexion and extension movements of the hand. The efficiency of the exoskeleton glove is evaluated by performing the basic movements of hand like the abduction, adduction, flexion, and extension. The developed hybrid exoskeleton glove can efficiently enhance the grasping capabilities of their users, offering, affordable, lightweight and easy to operate solutions that can assist the execution of activities of daily living (ADL).