A SOFT EXOSKELETON FOR HAND FINGER REHABILITATION APPLICATION USING FULLY ELASTIC PNEUMATIC ACTUATORS

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ABSTRACT

In recent years, there has been a growing demand for wearable actuators, that can be worn on individual body parts. This demand is dynamically increasing due to the numerous potential applications such as rehabilitation and enhancing load-bearing capabilities. Exoskeletons are mechanical structures that supplement or facilitate human movements and increase the body parts natural capabilities. Despite their wide range of applications, rigid exoskeletons have several deficiencies that required further developments. Soft actuators have been developed to address these deficiencies, forming one of the main categories of easily wearable exoskeletons. The two categories - rigid and soft exoskeletons - complement each other in their structures during applications. Soft robotic elements enable precise and delicate movements while providing adequate flexibility during use and rigid units are responsible for the stable frame structure and fixation. Their combined use is applied for rehabilitation, occupational safety, and enhancing work performance purposes. The aim of this article is to physically realize a device that has a legitimate purpose in the field of human hand rehabilitation. The goal was to design, manufacture, and functionally test the elements of a device capable of assisting in the rehabilitation of fingers using completely flexible actuators.

Keywords: soft actuator, soft exoskeleton, soft robotics, flexible hand rehabilitation