Robotics and Autonomous Systems Thesis Defense

Classification of Fabric Based Soft Actuators and Feedback Controller for At-home Hand Rehabilitation

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Abstract

With an aging population, the number of later in life health related incidents like stroke stand to become more prevalent. Unfortunately, the majority those who are most at risk for debilitating heath episodes are either uninsured or under insured when it comes to long term physical/occupational therapy. As insurance companies lower coverage and/or raise prices of plans with sufficient coverage, it can be expected that the proportion of uninsured/under insured to fully insured people will rise. To address this, lower cost alternative methods of treatment must be developed so people can obtain the treated required for a sufficient recovery.

The presented robotic glove employs low-cost fabric soft pneumatic actuators which use a closed loop feedback controller based on readings from embedded soft sensors. This provides the device with proprioceptive abilities for the dynamic control of each independent actuator. Force and fatigue tests were performed to determine the viability of the actuator design. A Box and Block test along with a motion capture study was completed to study the performance of the device. This paper presents the design and classification of a soft robotic glove with a feedback controller as a at-home stroke rehabilitation device.

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