Dual Purpose Upper and Lower Limb Rehabilitation Robot

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Technology description

Background

There are 800,000 new cases of stroke in the United States and Canada each year. In cases of stroke, it is common for the upper and lower limbs to become weakened or paralyzed. Robotic rehabilitation systems have been developed to assist in the delivery of movement therapy to both the upper or lower extremities to maximize return of function to the affected limbs. The robotic rehabilitation market is growing due to the increasing incidence of stroke and decreasing mortality rates creating a need for advanced rehabilitation tools. The market for robotic rehabilitation is expected to grow to $1.1 billion by 2021.

Robotic rehabilitation can facilitate training in individuals with severe motor impairments allowing a larger amount of work to be performed during a rehabilitation session. Additionally, rehabilitation robotics can provide quantifiable metrics which can provide deeper insight into to an individual’s recovery progression. The problem with the majority of robotic rehabilitation systems is that they are large, bulky, expensive, and are not suitable for in-home use.

Technology Overview

Researchers at the University of Western Ontario have developed a dual purpose rehabilitation robot for the hand and foot. The robot is an active mobile end-effector robot that is highly mobile, portable, and can generate movements and forces with 5 degrees of freedom; 2 translational and 3 rotational degrees-of-freedom. The forces generated by the robot can be adjusted to accommodate tasks for the upper or lower limbs. Attachments can also be added to the robot to allow users to perform specific functional upper and lower limb tasks. The robot was developed with safety as a primary feature; with redundant mechanisms in place to prevent the robot from exerting more force than what was determined by a user.

This rehabilitation robot can also be integrated into virtual reality systems, allowing users to control virtual avatars using any of the 5 DOFs available.

Application area

•Upper and lower limb motor rehabilitation for individuals with stroke, SCI, CP

Advantages

•Dual upper and lower limb usage
•Highly mobile
•Small footprint
•Suitable for in-home use

Institution

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