

Design and preliminary characterization of device for hand rehabilitation: MIT-hand-robot (*)

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Abstract: In 1991, at the Mechanical Engineering Dep. of Massachusetts Institute of Technology, a robot named MIT-Manus (Hogan, N., Krebs, H.I., Sharon, A. and Charnnarong, J., “Interactive robot therapist,” MIT: #5,466,213, USA, November 14,1995.) pioneered the field of Robotic Rehabilitation; it was introduced as a test bed to study neurological illnesses, to assist in and quantify the neuro-rehabilitation of motor function. MIT-Manus was characterized by a highly backdrivable mechanism with a soft and stable feel for the user, introducing a new brand of therapy and an excellent fit for shoulder and elbow rehabilitation in stroke patients. The greater reduction in impairment was observed in the group of muscles exercised, suggesting a need for additional robotic devices in order to rehabilitate other areas of the human body. Previous work expanded the MIT-manus including an anti-gravity robot for shoulder-and-elbow training and a wrist-robot (Krebs, H.I., Hogan, N., Williams, D.. and Celestino, J., “Wrist Manipulator or System and Method for Human Wrist Interface for Control of Devices, for Psychophysical Research and for Rehabilitation,” MIT, USA (patent pending)) for wrist flexion-extension, abduction-adduction, and pronation-supination training. In this work a new concept of using rotational actuators in Neurorehabilitation is presented: the “missing link”, a hand-robot (Krebs, H.I., Masia, L., “An Apparatus and Method for Converting Rotational Motion into Radial Motion,” MIT, USA (patent pending)) will be discussed in the basic system design and characterization.

(*) This work will be presented at Biorob 2006

