Refinement & Clinical Evaluation of the H-Man: A Novel, Portable and Inexpensive Planar Robot for Arm Rehabilitation after Stroke

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PROJECT DESCRIPTION:

H-Man is a compact low cost robot designed for the rehabilitation/training of planar arm movements. It has an H-shaped cable-driven differential mechanism. The advantage of this mechanism is that it results in a system that is homogeneous, lightweight, and intrinsically safe for use. It can provide forces of up to 30 N at the end-effector (handle) in any specified direction in a planar workspace to assist or resist the motion of the user; and can be easily built using off the shelf components. The reader is referred to [1] for a detailed description and characteristic parameters of H-Man, along with other studies where H-Man has been previously studied with control and stroke participants [2]–[5] to have a better understanding.

Researchers are currently building V2.0 of the H-Man which will be available soon, for commercial purposes. For further details, you may contact the personnel involved in this project (contact details as seen below).

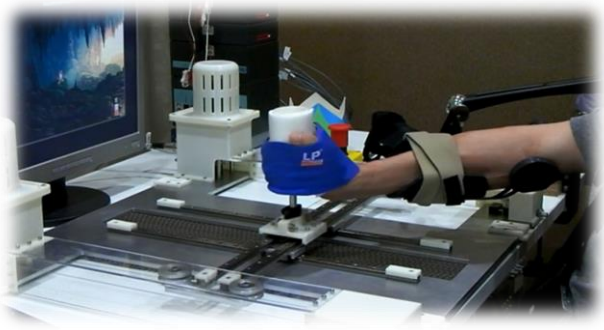

Figure 1: H-shaped cable-driven differential mechanism of H-Man

Figure 2: H-Man V2.0 releasing soon commercially

GRANT:
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PUBLICATIONS:

Refereed Journal (Published/In Press):

[1] D. Campolo, P. Tommasino, K. Gamage, J. Klein, C. M. L. Hughes, and L. Masia, "H-Man: A planar, H-shape cabled differential robotic manipulandum for experiments on human motor control.," *J. Neurosci. Methods*, vol. 235, pp. 285–297, Jul. 2014.

[2] Hussain, A. *et al.* Self-Paced Reaching after Stroke: A Quantitative Assessment of Longitudinal and Directional Sensitivity Using the H-Man Planar Robot for Upper Limb Neurorehabilitation. *Front. Neurosci.* **10,** (2016).

Refereed Conference (Published/In Press):

[3] A. Hussain, W. Dailey, C. Hughes, A. Budhota, W. G. K. C. Gamage, D. A. Vishwanath, C. Kuah, K. Chua, E. Burdet, and D. Campolo, "Quantitative motor assessment of upperlimb after unilateral stroke: A preliminary feasibility study with H-Man, a planar robot," in *International Conference on Rehabilitation Robotics (ICORR)*, 2015, pp. 654–659.

[4] P. Tommasino, A. Hussain, A. Budhota, C. M. Hughes, W. Dailey, and D. Campolo, "'Feel the Painting': a clinician-friendly approach to programming planar force fields for haptic devices," in *International Conference on Rehabilitation Robotics (ICORR)*, 2015, pp. 163–168.

[5] A. Hussain, W. Dailey, C. Hughes, P. Tommasino, A. Budhota, K. C. Gamage, E. Burdet, and D. Campolo, "Preliminary Feasibility Study of the H - Man Planar Robot for Quantitative Motor Assessment," in *International Conference on Intelligent Robots and Systems (IROS)*, 2015, pp. 6167–6172.