

Torque Balancing Active Wrist Brace

Tech ID: 28743 / UC Case 2015-780-0

BRIEF DESCRIPTION

The invention is an orthopedic brace to aid in the rehabilitation of hand movements in stroke survivors. This spring-actuated brace provides the necessary hand-forearm support and counterbalances wrist stiffness/resistance to stretch typical to stroke patients. This device significantly reduces the effort required for a hand movement in patients with varying degrees of motion impairment.

FULL DESCRIPTION

Physical impairments, such as excessive wrist stiffness and resistance to stretch (or “tone”), are typical consequences of a stroke. These changes may cause significant pain and are known to increase the torque demand on wrist muscles, affecting the overall hand movement. Therefore, a wrist support system that can mitigate the additional muscle stress experienced by stroke survivors and ease the hand movement is needed in order to reduce the possibility of negative effects during rehabilitation therapy and improve therapy outcome.

UCI researchers have now developed the first supportive active wrist brace that dynamically cancels out the torque demand on the wrist joint of the stroke survivor, thereby decreasing the muscle force required to achieve hand motion. The new device consists of a special mechanical linkage, which connects a forearm support to a hand support and counteracts the torque arising from the increased stiffness of muscles of stroke patients. In addition, the proposed design is amenable to adjustments to provide different counter-torques as needed. Overall, the invention helps lessen the muscle force burden on the stroke survivors and allows for the attainment of a wide range of hand motions (nearly complete flexion to complete extension).

SUGGESTED USES

Hand movement rehabilitation in stroke patients.

ADVANTAGES

- Device allows significant reduction in the muscle force needed for hand movement
- First active hand brace to provide negative stiffness for wrist movement, counteracting wrist stiffness intrinsic to stroke survivors

PATENT STATUS

| Country | Type | Number | Dated | Case |
|--------------------------|---------------|------------|------------|----------|
| United States Of America | Issued Patent | 11,331,209 | 05/17/2022 | 2015-780 |
| United States Of America | Issued Patent | 10,456,286 | 10/29/2019 | 2015-780 |

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OTHER INFORMATION

CATEGORIZED AS

- » Medical
- » Rehabilitation

RELATED CASES

2015-780-0

STATE OF DEVELOPMENT

A prototype has been tested on stroke patients.

RELATED MATERIALS

- » https://www.researchgate.net/publication/285801338_Kinematic_synthesis_of_Stephenson_III_six-bar_function_generators - 03/01/2016
- » Master of Science Thesis by Derek Michael Bissell, UC Irvine - 01/01/2014

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