Kinematical chain for assisting the motion of a spherical joint

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PATENT STATUS: Granted

PRIORITY N°: 102017000079086

PRIORITY DATE: 13/07/2017

PUBLISHED AS: IT; PCT; EP; US

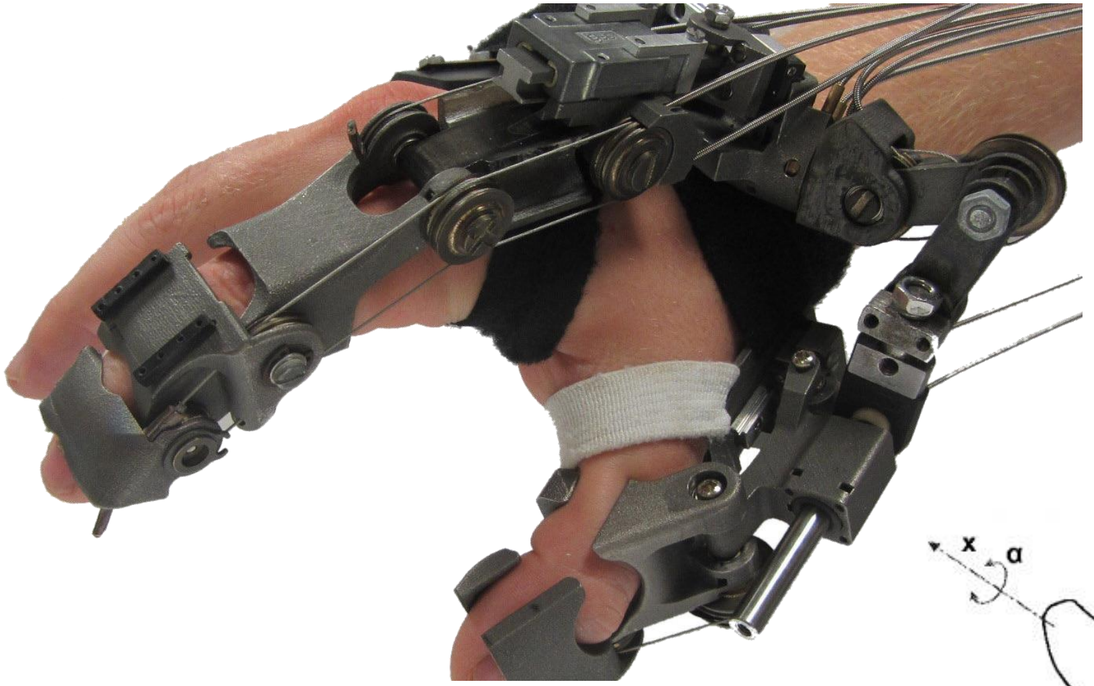
Invention

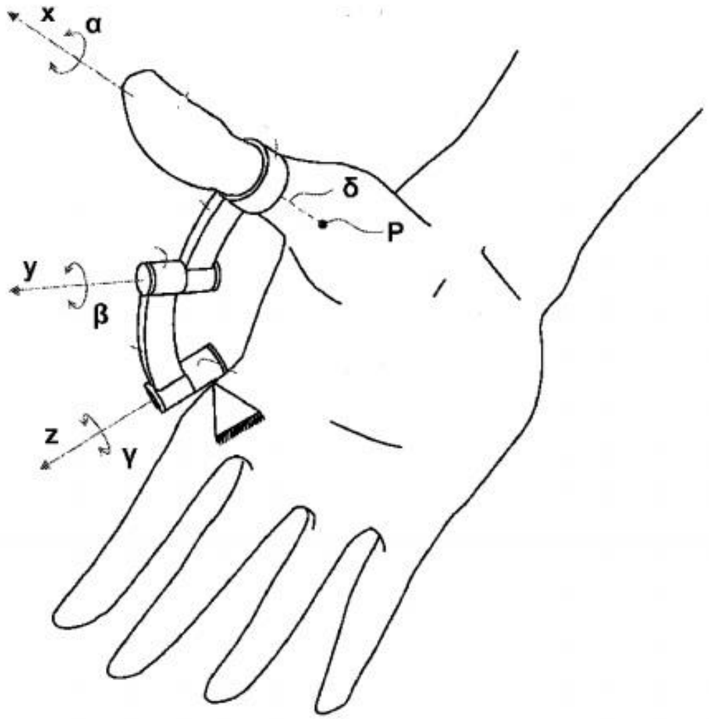
The development of wearable exoskeletons for the hand is very complex, having to adapt to very different sizes, wear them easily, apply torque to the joints in the right direction, have a small footprint and a rigid or yielding human-robot interface depending on the need of the rehabilitation treatment. The invention meets these requirements in a single wearable solution regardless of the size, the tasks it must perform and the force it must exert. The hand is characterized by a high number of bones and joints, a trauma if not treated properly can alter its functionality. It is therefore necessary to have devices that adapt to different sizes, that are easily worn, that apply the torques to the joints in the right direction, that have a small footprint and that can create a rigid or flexible human-robot interface according to the need for the treatment. rehabilitation. The invention consists of an exoskeleton with a variable fit thanks to a hand-robot coupling system similar to the strap of a watch with links. Furthermore, an elastic component allows to have joints actuated in series with rigid control of the position and yielding of the force. Finally, the exoskeleton also provides kinematics for the thumb which notoriously works differently from the other fingers.

The main advantages are:

- Portability
- Variable fit and sizes
- Compliance
- Variably rigid or yielding control
- The joints implemented in series allow to move the phalanges in a rigid or yielding way
- The layout of the thumb kinematics mechanism is compact and functional.

Drawings
& pictures





Industrial applications

The main applications are:

- Neuromuscular rehabilitation of the hand
- Rehabilitation after osteoarticular, ligamentous and tendon trauma
- Virtual reality
- Augmented reality

Possible developments

The research group is interested in obtaining industrial collaborations aimed at increasing the technological maturity of the present invention or industrial partners interested in taking the license of the technology object of this patent.

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