

# A Pediatric Robotic Thumb Exoskeleton for at-Home Rehabilitation

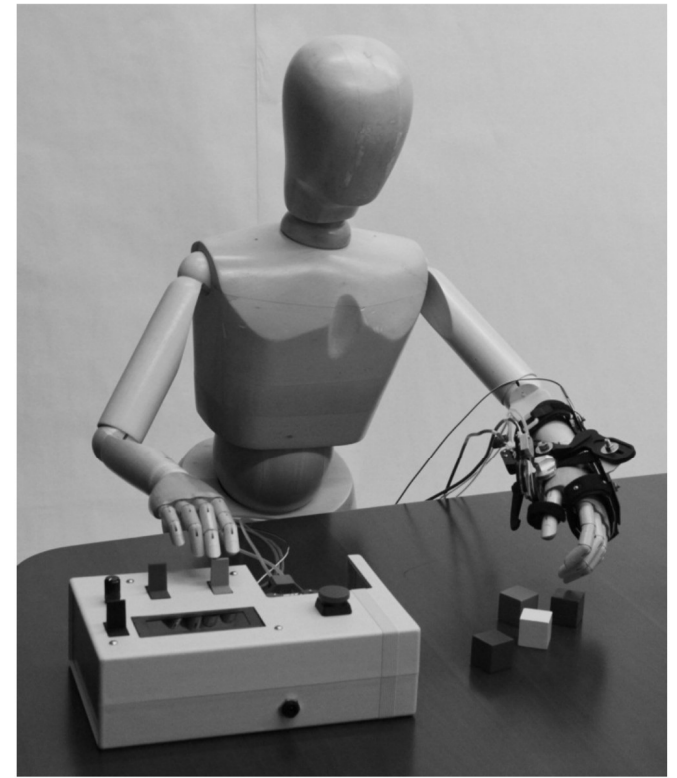
## The Isolated Orthosis for Thumb Actuation (IOTA)

Patrick M. Aubin, Hani Sallum, Conor Walsh, and Leia Stirling:

The Wyss Institute for Biologically Inspired Engineering, Harvard University, USA

Annette Correia: Boston Children's Hospital, USA

- Two degrees of freedom active orthosis for children 7 to 12 years old.
- Servo assistance of the carpometacarpal and metacarpalphalangeal joints.
- Control modes intuitively aid with opposition grasp and fine motor tasks.
- Lightweight and mobile platform to facilitate tele-rehabilitation.

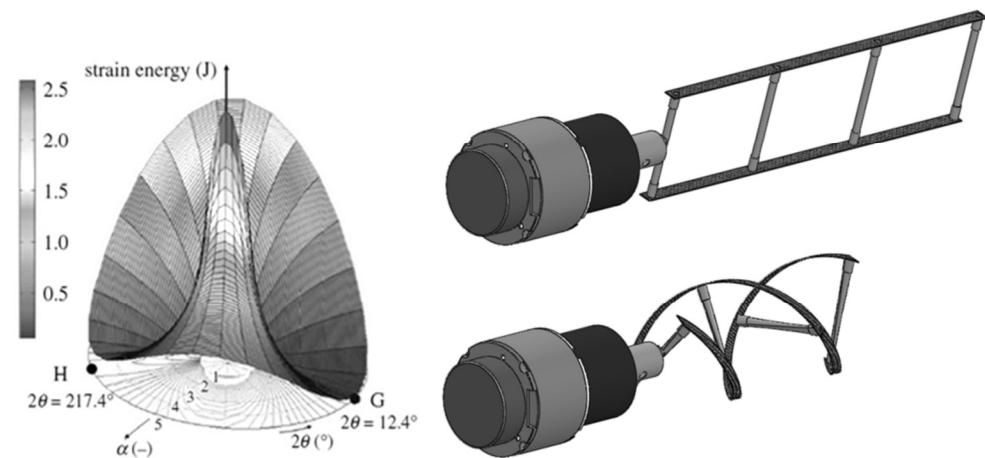


# CARAPACE

## a novel Composite Advanced Robotic Actuator Powering Assistive Compliant Exoskeleton Preliminary Design

L. Masia\*, X. Lachenal, A. Pirrera, L Cappello, F. Mattioni, P. Weaver and P. Morasso

- A novel design for actuation in assistive robotics.
- Multidisciplinary approach using multistable composite structures coupled to conventional electromechanical actuator.
- Well-behaved nonlinear structural deformations for light assistive exoskeletons.



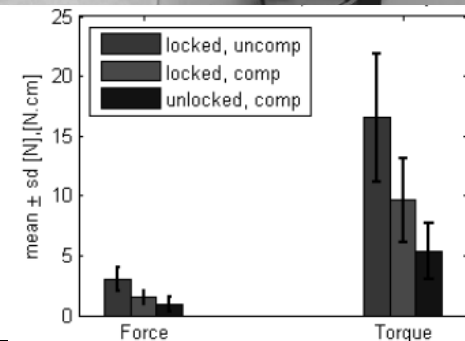
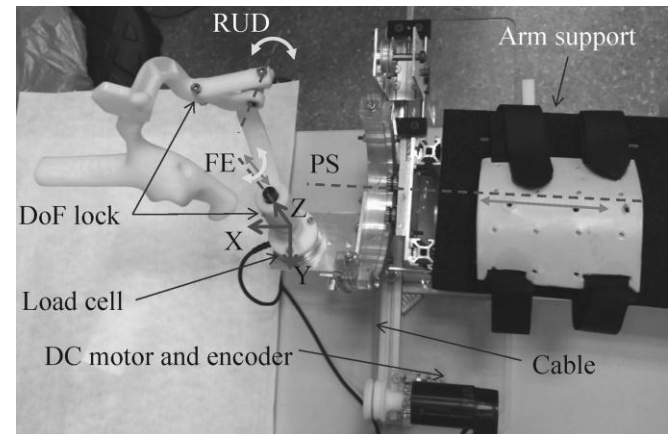
# Hyperstaticity for Ergonomic Design of a Wrist Exoskeleton

M Esmaeili, D Campolo: Nanyang Technological University (NTU)

N Jarrassé: CNRS, France (UMPC)

W Dailey, E Burdet: Imperial College London, UK

- This paper presents a practical solution to increase the level of transparency in rehabilitation robots focusing on the prono-supination degree of freedom of the forearm
- Avoid hyperstaticity the level of undesired force and torque in the wrist is reduced by 75% and 68% of the, respectively.



# Modeling, Design, and Optimization of Mindwalker Series Elastic Joint

Shiqian Wang<sup>a</sup>, Cor Meijneke<sup>a</sup>, Herman v.d. Kooij<sup>a,b</sup>

a: Delft University of Technology, b: University of Twente

- SEA weighs 2.9kg and consists of
  - A compact linear actuator, weight: 1.1kg, Power: 960W
  - And a double spiral torsion spring, allowable torque: 100Nm, stiffness 820Nm/rad
- Power-based quasi-static modeling and design optimization;
- large inertia of outrunner motor doesn't necessarily cost more energy.
- Energy efficient motors are paramount for wearable exoskeletons.

