Exoskeleton for the assistance of polyarticular joints

INVENTORS: Andrea Baldoni
Simona Crea
Nicola Vitiello

STATUS PATENT: Granted

PRIORITY N° : 102018000009208

PRIORITY DATE: 05/10/2018

PUBLISHED AS: ITA/PCT/EP

Invention

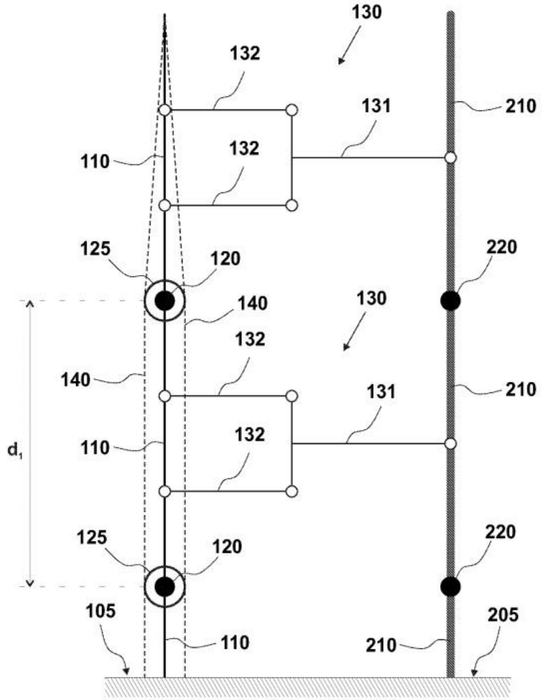
The new generation of exoskeletons are going more and more towards simple and functional solutions. In particular, there is the need to find a simple and efficient architecture to create exoskeletons to assist polyarticular joints, such as for instance finger phalanges or the vertebral column. A very serious problem concerns the size and weight of these devices maintaining the ability to perform different tasks. Furthermore, the exoskeletons associated with polyarticular joints present a problem of alignment with the anatomical assisted joint, having to be arranged laterally or above. The alignment and the correct functionality of an exoskeleton and of the assisted anatomical joints is solved by the use of polyarticulated exoskeletons with lateral or upper joints. However, this solution is considerable bulky and has poor correspondence in terms of movements between the anatomical and robotic centers of rotation.

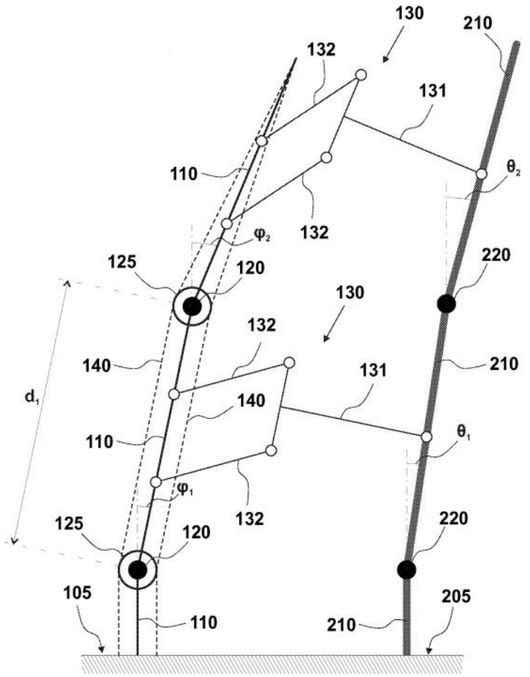
The invention is a polyarticulate exoskeleton that uses an underactuated kinematics, where the center of rotation of the anatomical joint is fixed and that of the exoskeletal joint has movement capability (bending) allowing the robotic structure to slide on the anatomical structure. This invention is suitable for a wearable active robot with more than two articulated modules, as the polyarticulated kinematic, which supports the spine, the finger or all the fingers hand.

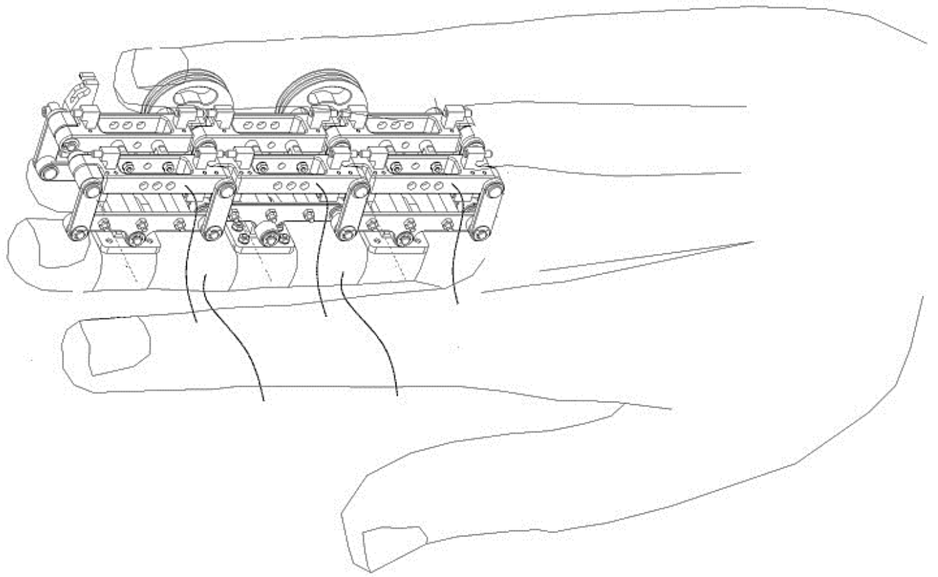
The main advantages of current technology are:

- Lightness and compactness
- No bulky
- Applicability of the polyarticulated kinematic chain, even to non-wearable robots or other types of machines.

Drawings & pictures







Industrial Applicability

Fields of application are:

- Wearable robotics
- Rehabilitation robotics
- Assistive robotics
- Prosthetics
- Orthosis

Possible developments

The technology of the patent is in a development phase, not yet fully mature for the market with the respective products.

The TRL is still to be considered low (eg: 2/3) suitable for experimental validation prototypes.

Still numerous other insights are needed by the research team to make the technology effectively applicable to wearable robotics.

For more information:

Tech Transfer Office of Scuola Superiore Sant'Anna

Headquarters: Piazza Martiri della Libertà 33, 56127, Pisa

Web site: https://www.santannapisa.it/it

E-mail: uvr@santannapisa.it

For more information:

Ufficio Regionale di Trasferimento Tecnologico

Headquarters: Via Luigi Carlo Farini, 8 50121 Firenze (FI)

E-mail: urtt@regione.toscana.it

SANT'ANNA SCHOOL OF ADVANCED STUDIES PISA

REGIONE TOSCANA

urtt Ufficio Regionale di Trasferimento Tecnologico