ELBOW JOINT EXOSKELETON

Introduction

The occurrence of function deficit, weakness or fatigability of the upper limbs, in particular the elbow joint, is not geographically subdivided. There are 400-800 thousand strokes per year in Poland, which are one of the causes of deficits of this type. Moreover, a significant group of patients may be elderly people (6-10 mln Poles), in whom a similar negative deterioration of the upper limb function occurs as a result of neurodegenerative changes in the aging process. For these reasons, any deficit in this area reduces health-related quality of life.The elbow joint is the most complex human joint. For the above-mentioned deficits there are no alternatives other than the proposed exoskeleton for the elbow joint. An exoskeleton is a device worn on the body or a part of the body to support the movement of the user either passively (by facilitating movement through partial pressure relief and movement support using elastic bands, springs) or actively (by facilitating movement using actuators, etc.).

Advantages

Quality advantages:

- individual fit and manufacture by 3D scanning and 3D printing methods,
- support of elbow joint function,
- immediate improvement of function (reaching, interaction with object),
- shaping of function improvement over a longer period of time.

Technological advantages:

- possibility of daily use at home,
- gradual adaptation (including through component replacement) to changes in health status.

Environmental advantage:

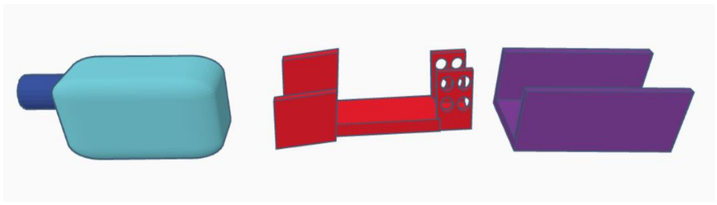
- solution that changes with the patient (with adjustable or replaceable components, environmental advantage - no need to replace the whole device).

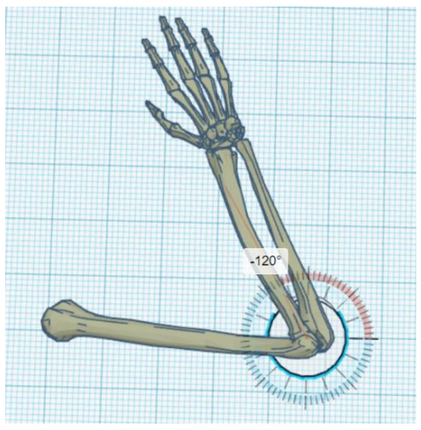
Cost advantage:

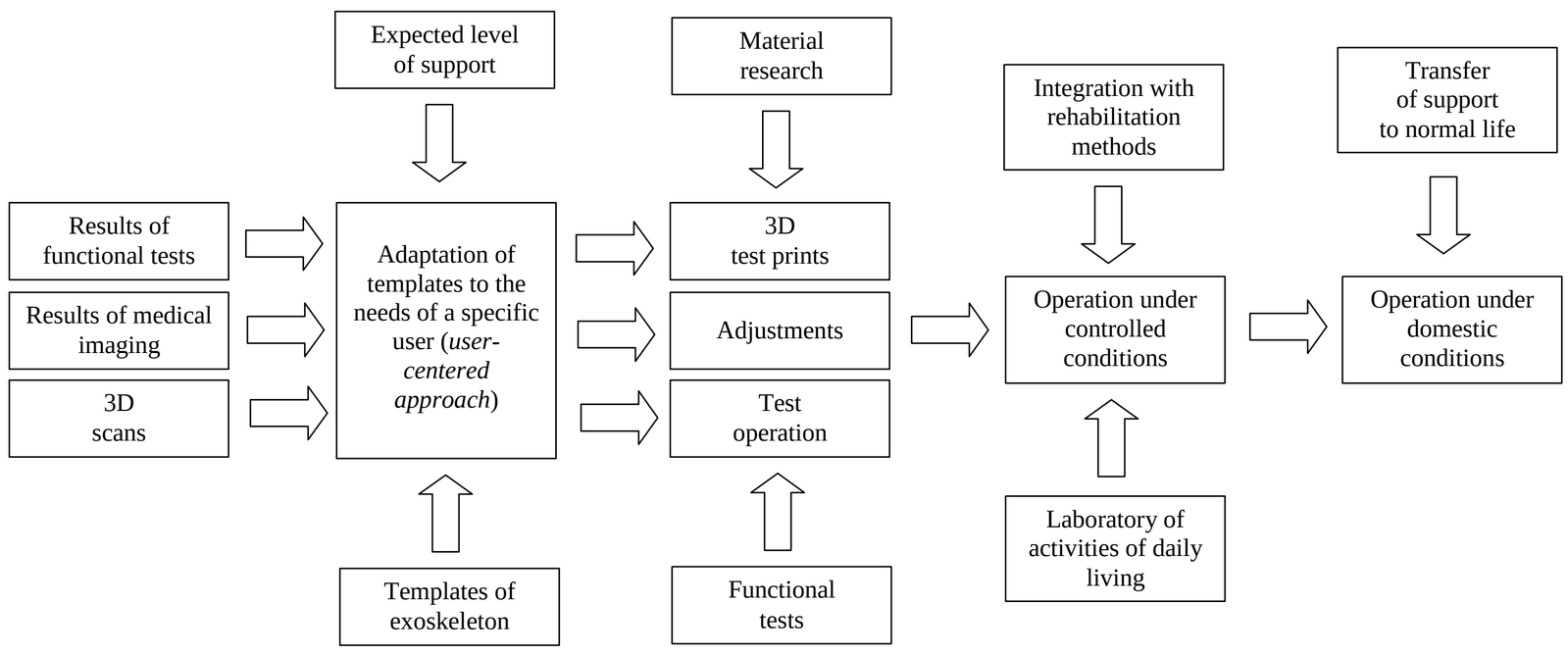
- domestic production, lower costs.

Price advantage:

- on-site availability (including examination and scanning).







Main idea

The solution implements the concept of personalised therapy. 3D scanning makes it possible to record the characteristics of the upper limb structure in the form of digital files. The combination of 3D scanning technology and 3D printing in the form of reverse engineering gives the possibility of relatively inexpensive creation (with adaptation to a specific user) of a digital design of an exoskeleton with a complex internal and external structure on the basis of a physical equivalent (including anatomical). 3D printing makes it possible to create an exoskeleton from digital files, with parameters selected individually for each child (dimensions, strength, flexibility, weight, support strength, etc.).

Applications

The described invention develops medical technologies in non-invasive therapy, rehabilitation and care.
The primary aim is to support rehabilitation and independent functioning of the patient under normal home conditions.
The secondary aim is to market a new product offering new functionality on a national scale: a passive exoskeleton (support based on elastic elements) and an active exoskeleton (support based on actuators) for people with function deficit and/or muscle weakness in the elbow joint area.

Patent application: pending

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