



# MECHATRONIC SYSTEM OF TRAJECTORY MODIFICATION OF A HUMAN KNEE PROSTHESIS

## Ideas on utilisation

The subject of the offer is a mechatronic system for very accurate imitation of the movement of the knee joint - movement between the tibia and femur, including rolling and sliding. The mechanism, owing to the use of a mechatronic system consisting of three drives, can imitate previously measured and recorded data about the movement of the patient knee joint and allows to adjust the trajectory for their individual needs. In addition, the movement of the other knee joint can be treated as a reference and can be measured by the same mechanism. The invention is covered by patent protection.

## Potential adopters of technology

The essence of the solution is a mechatronic system to modify the trajectory of a human knee prosthesis equipped with three drives. Thanks to the use of variable length elements it is possible to adjust the prosthesis trajectory.

## Advantages of technology

An innovative invention brings the following benefits:

- imitation of the complex movement of the knee joint owing to the use of front and rear linear drive,
- very precise regulation of the trajectory of the instantaneous centre of rotation for individual needs
- adaptation to the required movement of the knee under real time
- simple structure and little complicated construction of the device,
- the ability to monitor the very precise control of movements,
- a wide range of the trajectory of the instantaneous centre of rotation possible to obtain,
- when the joint is overloaded, the mechanism locks drives, keeping them stiff until the load is reduced,
- in order to determine the correct trajectory, the patient movement data registered previously can be a reference point. Movement of the other knee can be a reference point.
- the device can imitate previously measured and recorded movement, which can be used during rehabilitation.

## Market and context of technology

The invention is applicable in the case of soft injuries such as sprains, tendon and ligament damages, in particular during rehabilitation, as well as a knee joint replacement (implants and prostheses) or in devices for supporting the human knee (orthosis). It can also be successfully used in the design and construction of humanoid robots and an exoskeleton. The recipients of the system are companies producing orthopaedic equipment as well as rehabilitation and physiotherapy centres.

## Preconditions in adopting enterprises

Use of materials intended for the construction of prostheses.