A task-custom finger device for kinesthetic and cutaneous feedback

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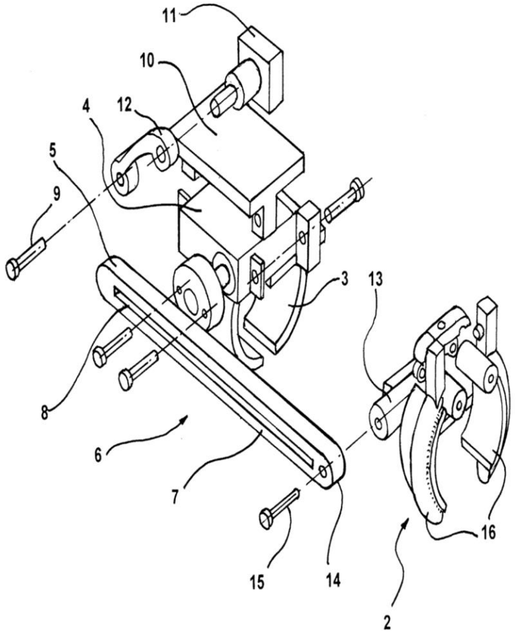
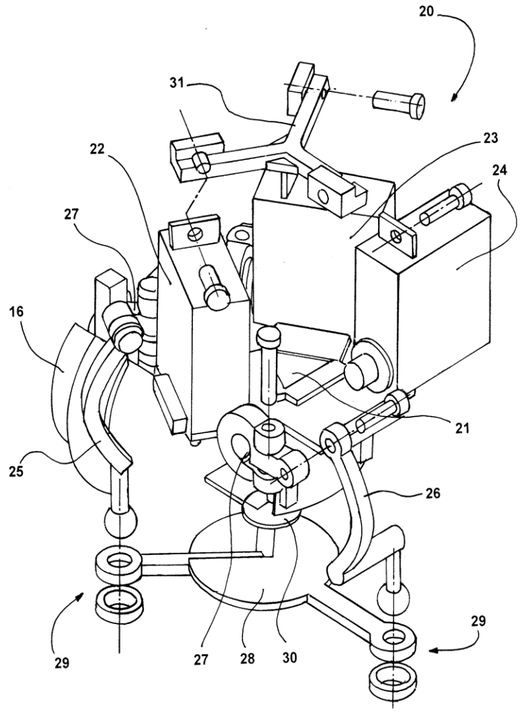
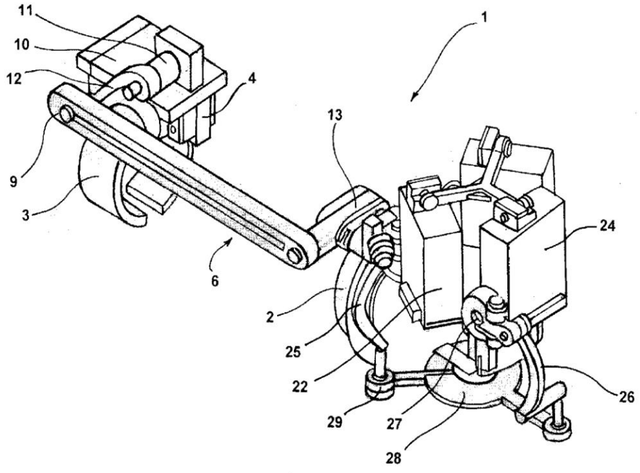
Invention

The invention consists in a customizable exoskeleton haptic device for a finger, providing both kinesthetic stimuli along the finger and a three-dimensional skin force on the surface of the fingertip, which can be generated independently of each other or at the same time. The device can be used for rehabilitation, video games, and remote control of manipulators. The finger exoskeleton includes a proximal portion, designed to be worn on the first phalanx of a finger, and a portion for the fingertip, designed to be fixed to the distal phalanx and equipped with an anchoring clamp. The proximal portion comprises a proximal servomotor, which acts on a link having an extendable rod connected to the portion for the distal portion of the finger, further includes a potentiometer for sensing rotation of the distal link relative to the proximal portion. The distal portion comprises three different distal servomotors, arranged to form a triangle by their respective axes, and a rotatable haptic platform connected to the axes of the servomotors spaced across the respective arms. The haptic platform is positioned to be in contact with the fingertip.

Drawings & pictures







Industrial applications

The technology can be applied to the Life Sciences, particularly in the development of assistive and rehabilitative therapies. In addition, given the ability to perform remote operations, the technology will further find application in the field of telesurgery.

Industry 4.0 is a further field of application, essentially in Robotics, Artificial Intelligence and collaborative machines; given the possibility of declination in play and/or augmented or virtual reality, the invention may finally find application in the areas of augmented and virtual reality and multisensory telepresence systems or robotic and augmented reality technologies and sensor systems for maintenance predictive and training.

Possible developments

A possible technological development project consists in improving the current prototypes and testing their functionality in a real operating environment, reaching at least a level of TRL7 from the current TRL4. To this end, the research group is looking for industrial partners operating in the specified application areas. The University of Siena is available to sign specific agreements for the technological maturation, license or option of the patent title linked to the invention.

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