

A survey of new devices and modes used in hand recovery

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Abstract

This paper is aimed at making a presentation of the devices used in hand recovery. A classification of such devices will be presented along with the main benefits brought forth as well as new development directions. Recovery devices may be classified as passive, active, haptic and coaching devices. Passive devices may only be used if patients are able to use their hands and arms. Unlike passive devices, active devices are meant to take over certain activities of the human body and the users are helped to move their limbs even if they cannot move them (for instance exoskeletons). Haptic devices (e.g. robotic gloves) may be active or passive giving feedback to the user, who has a sensation of touch or of vibration. Coaching devices are based on giving feedback in relation to the correctness or manner of performance of the recovery exercise. The gamification concept is used in this type of devices, while the coaching mode is presented with the aid of virtual, augmented or mixed reality. To use this type of devices there is no need for the specialist physician to be present and is able to monitor patient activity remotely. The Leap Motion device is also part of this category of devices. Hand recovery is achieved by means of exercises which consist in dynamic or static hand gestures. The gestures are detected by processing data with the Leap Motion device with the aid of classical methods (mathematical formulas) or by training neural networks. These methods are approached by us in detecting the gestures used in recovery. The main benefits generated by the use of coaching devices are possibility for the physician to monitor several patients remotely, providing comfort with respect to the place and manner of performance of the recovery exercises and reducing implementation costs.

Keywords:

Hand Recovery; Gesture; Recovery Devices