



DESIGN AND DEVELOPMENT OF 3D PRINTED MYOELECTRIC ROBOTIC EXOSKELETON FOR HAND REHABILITATION

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Abstract- The development of dynamic rehabilitation devices can be evaluated as a research fast-growing field. Indeed, robot-assisted therapy is an advanced new technology mainly in stroke rehabilitation. Although patients benefit from this enormous development of technology, including the presence of rehabilitation robots, the therapeutic field still suffering a lack in hand robotic rehabilitation devices. In this context, this work proposes a new design of a 3D printed hand exoskeleton for the stroke rehabilitation. Based on the EMG signals measured from the muscles responsible for the hand motion, the designed mechatronic system detects the intention of hand opening or hand closing from the stroked subject. Based on an embedded controller and five servomotors, the low cost robotic system is able to drive in real time three degrees of freedom (DOFs) for each finger. The real tests with stroked subjects showed that the designed hand exoskeleton architecture has a positive effect on the motion finger range and mainly in the hand ability to perform some simple tasks. The case studies showed a good recovery of the motor functions and consequently the developed system efficiency.

Index terms: robotic exoskeleton; 3D printing; EMG control; features extraction; stroke rehabilitation.