

DESIGN A PROTOTYPE FOR REHABILITATION ORTHOTIC DEVICE

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This paper presents some CAD models and a virtual prototype for existing rehabilitation orthotic device designed to train stroke patients to correct knee hyperextension during stance and stiff-legged gait (defined as reduced knee flexion during swing). The knee brace provides variable damping controlled in ways that foster motor recovery in stroke patients. An electrical motor, variable damper, based component is used to facilitate knee flexion during stance by providing resistance to knee buckling. Furthermore, the knee brace is used to assist in knee control during swing, i.e. to allow patients to achieve adequate knee flexion for toe clearance and adequate knee extension in preparation to heel strike. The detailed design of the orthosis, the first prototype built, closed loop control results and initial human testing are presented here.

Approximately 80% of stroke survivors present an early motor deficit, with 50% having chronic deficits. Impairments such as spasticity, muscle weakness, loss of range of motion, and impaired force generation create deficits in motor control that affect the stroke survivor's capacity for independent living. Robotic and mechatronic technologies that can be integrated into portable devices and can be used by patients in the home setting are particularly attractive in the above-discussed context because they have the potential of providing tools to facilitate functional recovery, reducing cost of treatment and providing patients with adequate level of independence.

For many patients, a programmable actuated knee orthosis could guide and facilitate the recovery of a more efficient and clinically desirable gait pattern via retraining sessions. Current clinical practice is generally restricted to brief periods of less than 1 hour of gait training and provided a few times per week. In between these sessions, patients continue to walk using their typical gait pattern, and reinforce compensatory patterns of gait.

As in this study we want to project, realize and implement a mechatronical system (an active robotized orthosis), what shall can help the persons finder out in a certain therapy regenerative neuro-motory. The project is at beginning, but we expect very good performance from this study. This research is the object of the IDEI Program Project ID_147 (2007-2010), hence the paper is financed from this project's budget.



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