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V. Monaco, J. Jung, G. Marcì, S. Bagnato, S. Micera. Robotic system for gait rehabilitation of stroke patients in the acute phase. Gerontechnology 2008; 7(2):166. Two/third of the stroke patients experience disabilities, which involve, among others, walking dysfunctions[1]. The conventional rehabilitation therapy during the acute phase of the disease contemplates: (i) passive manipulation of the legs; (ii) exercises aimed at the control of the trunk; (iii) training of the postural transitions. These exercises have an important role to prevent the complications due to immobility, but they are not very useful for the motor learning, because they do not have a task-oriented meaning and have a doubtful motivational impact for the patient. Robotic manipulation has been already introduced in the post-stroke therapy[2] but most of the commercially available systems require to get patients out of bed, do not permit a leg joint flex-extensions similar to natural walking, and have not been thought to provide cognitive stimuli related to the gait cycle. A new robotic system, trying to overcome the previous limits, is presented. **Methods** NEUROBike is a new robotic platform designed to rehabilitate the gait, in term of biomechanical as well as neurological issues, as early as possible, after the stroke. The robot was designed following these requirements: (i) leg joint angular excursions similar to the ones during natural walking, accounting the walking speed; (ii) reduced contact between legs and robot; (iii) working with people on the bed; (iv) providing cognitive stimuli related to the gait cycle timing; (v) open control of the platform, to relate the therapy, according to the features of the patients. Furthermore, the system was designed to send bilateral and alternate inputs to the CNS in order to address the brain plasticity toward the recovery of the physiological motor abilities. **Results and discussion** The figure shows the concept of the mechanical system. The main parts are: (i) rotatable end effector mounted on a X-Y orthogonal system (total 3 DOF), as foot-moving device; (ii) lateral walls avoiding leg motion in the frontal plane; (iii) knee wrappers, to run the legs smoothly on the walls and facilitate the knee flexion without pushing under the knee; (iv) a hip support. Moreover, an open control architecture, accounting I/O and biofeedback and involving video and acoustic signals, has been developed. The device was designed to work under the max condition with a subject 1.9 m height, 150 Kg weighted, at 1.24 m/s walking speed.

References

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Address: Scuola Superiore Sant'Anna, Italy; E: v.monaco@imtlucca.it

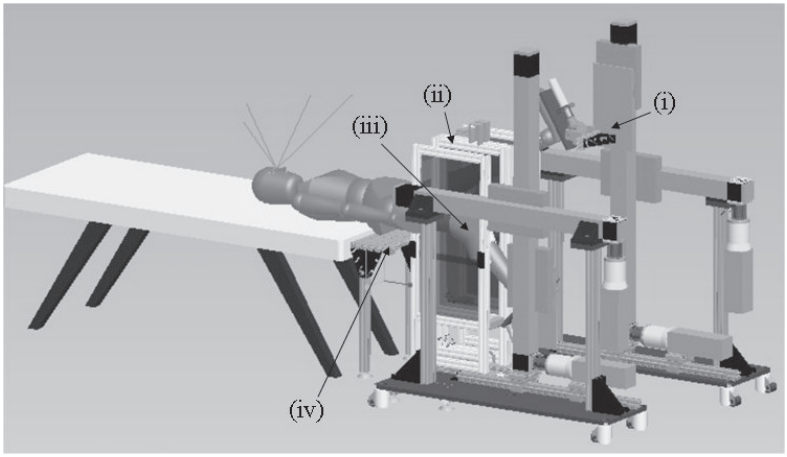

Figure 1 NEUROBike system