

GRAZIE: a new robotic platform for rehabilitation

The goal of the project is to design & validate a rehab-workstation as follows:

- Two arms, impedance controlled, modular, safe, haptic robotic system, integrated with a flexible/adaptive man-machine environment, capable to provide
- **Neuromechanical assistance** to shoulder/elbow/wrist movements for hemiparetic patients
- **Neuroelectric assistance**, via performance dependent FES (Functional, Electrical Stimulation)
- **Neurocognitive assistance**, via a VR (Virtual Reality) subsystem
- **On-line functional assesement** of motor performance performed by the robot
- **Emphasis on human factors and safety**

Partners:

- ❖ University of Genova, DIST, Italy (coordinator)
- ❖ University of Aalborg, SMI, Denmark
- ❖ University of Southampton, SOHPRS, UK
- ❖ Klinik Berlin, Neurological Rehabilitation, Germany
- ❖ JRC, Ins. for the Protection and Security of the Citizen, EU
- ❖ REHA-STIM, Berlin, Germany
- ❖ Celin-OMA, La Spezia, Italy

Pietro Morasso



Available robotic prototypes

Braccio di Ferro

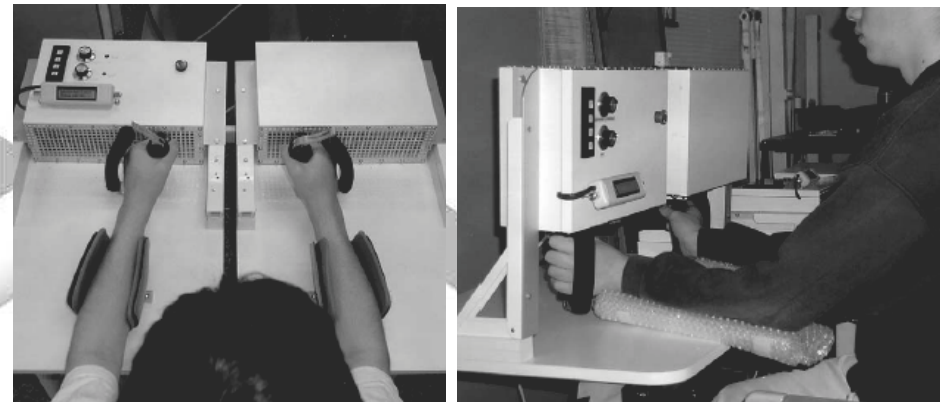


Main features

- Elliptical workspace: (80x40 cm)
- Spatial resolution < 0.1 mm
- Variation of the manipulability index < 10%
- Anisotropy index < 2
- Two brushless motors, direct coupling
- Continuous exertable force > 50 N
- Maximum exertable force > 200 N
- F/T (Force/Torque) ratio > 2 N/Nm
- Dry friction < 0.1 N
- Inertia < 1 kg
- Impedance control, fast prototyping RT SW



Bi-Manu-Track



Main features

- Large range of motion
- Good spatial resolution
- Two brushless motors with direct coupling
- Continuous exertable torque 5 Nm
- Small dry friction
- Small inertia



Redesign and modular upgrade: 1) second haptic arm, 2) motorized selection of height & operational plane, 3) compliant wrist (2 dof).