N. Vitiello, C.M. Oddo, S. Roccella, S. Micera, M.C. Carrozza. Digitus: towards a platform for the characterization of the finger biomechanics in fine manipulation. Gerontechnology 2008; 7(2):232. The characterization of finger biomechanical properties and of the motor control implemented during pinch grasping is a challenging research subject in the fields of neurophysiology, biomedical engineering and gerontechnology. As a matter of fact, understanding the complex neuromuscular interactions involved in finger fine manipulation tasks is a critical issue which has recently been approached from different perspectives. Many studies are devoted to a characterization of finger physical parameters and to understand the control strategies used by the Central Nervous System (CNS) in order to perform different tasks. Zatsiorsky et al.[1] studied the differential effects of gravity and inertia on finger forces during manipulation of hand-held objects, Gao et al.[2] showed the importance of the adaptation of force direction and magnitude for accurate manipulation, Edin et al.[3] discovered that the force distribution among the digits during precision lifting represents a digit-specific lower level neural control establishing a stable grasp. What follows from the literature is the need to have appropriate software and hardware tools for the finger biomechanics characterization. Digitus is a novel platform designed to match this requirement. Digitus is mainly ended to the finger pinch task, chosen as reference task for investigating the biomechanics of aging in the fine manipulation. **Platform description** Digitus (*Figure 1*) is a 2 active and 1 passive DoF (Degree of Freedom) closed kinematics chain planar robot. The active Dof are actuated by means of RE30 DC Maxon motor, connected to the joint axes by a planetary gear with reduction ratio equal to 4.8. The link lengths were fixed in order to have a rectangular workspace in which Digitus can generate a force with a maximum module equal to 25 N in every direction. Due to the low reduction ratio and the low link inertias is Digitus a fully backdrivable robot, so that it can be both compliant when the finger moves stiff or if, by an appropriate interaction control law, a force field is generated. This behaviour is crucial to use Digitus as an hardware tool for biomechanics characterization. Regarding the sensory system, the Digitus is equipped with two digital Maxon MR-encoder and a custom 3 axial load cell at the end effector. The mechanical interface between the finger and Digitus is modular and easily designed for each specific task. In Figure 1, one possible kind of interface is represented. The control system is embedded on Altera Cyclone® II FPGA electronics board to have high computational performances and high flexibility in controlling Digitus by remote PC.

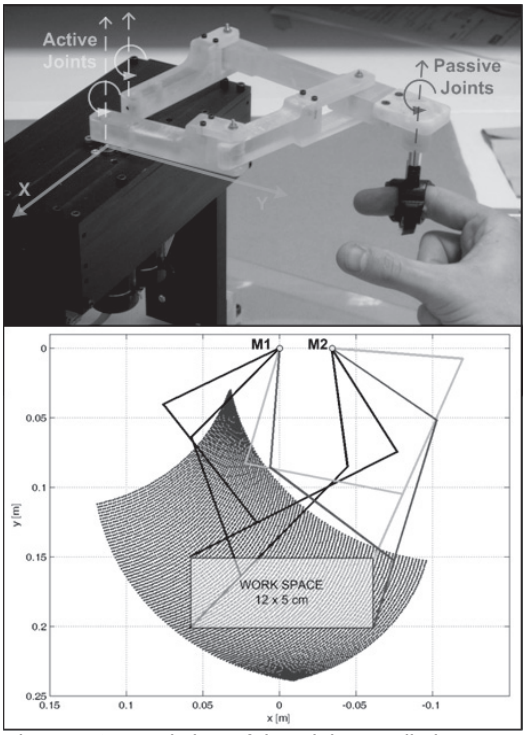

Figure 1 General view of the Digitus preliminary prototype and its workspace

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