

Invited Talk

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## BioRobotics Research Topics for Healthy Living and Active Ageing

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**Abstract** - Nowadays ICT and robotic technologies are experimenting an increasing number of opportunities to be exploited in several scenarios of daily living. Particularly, the integration of Robotics, Internet of Things and Artificial Intelligence is an interesting approach that enables the possibility to design and develop new frontiers in personalized and precision medicine, cognitive frailty and cooperative robotics. In this context, this talk aims to present the main results in the development of BioRobotics solutions aiming to face bioengineering challenges in 1) objective assessment in Parkinson disease, 2) objective neuropsychological assessment and rehabilitation in Mild Cognitive Impairment, and 3) physical and cognitive stimulation and rehabilitation in cognitive frailty. The development of wearable sensors for fine biomechanical analysis of movement, combined with artificial intelligence techniques is, for example, at the base of creating a framework to objectively quantify the UPDRS scores in Parkinson and identify challenging opportunities in early diagnosis and therapy control. Similarly, the use of these technologies is also increasing in MCI neuropsychological assessment, for example in the development of tools able to combine physical exercise and traditional cognitive test. Finally, social robotics highlights another fundamental scientific problem in cognitive human robot interaction, aiming to develop cognitive models for robots and understanding human mental models of robots. In this context, perception capabilities of robots could be achieved through emotion and gesture recognition, combined with supervised or unsupervised approaches. Interestingly, social robotics plays an important role, not only for pure human robot interaction, but also for bioengineering applications, as demonstrated by the fact that a substantial part of research work in this area deals with treatment of children with ASD or elderly with mild cognitive impairments.