Experiences and challenges in medical assisting devices

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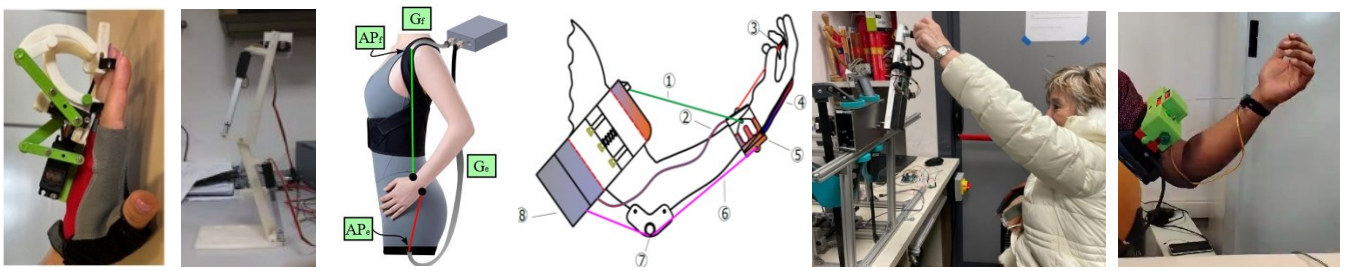
Abstract.
Challenges in Mechanism Design for medical assisting devices can be considered from several viewpoints in technical, social, and financial ones as a new strongly emerging service field referring specifically to elderly people. In this lecture main issues are discussed in terms of Innovation aspects coming from Mechanism Design as specifically addressing the needs and requirements for motion assistance of elderly people. The attention is focused on challenging aspects that are related to the mechanical structure and operation of motion assistance when considering tasks either in rehabilitating or helping elderly people in motion autonomy. The lecture presents aspects emphasizing the role of mechanism design in developments of medical assisting devices as based on the fact that the action in performing tasks, either in coordination or not with nursery operators, is of mechanical nature due to motion and force transmission goals of the motion assistance. The challenges of mechanism design are presented both in terms of technical solutions and community activity, since each of them depends, impacts, and generates each other. Examples of past and current solutions are presented from the experience of the lecturer team to show how a mechanism design can be determinant for successful achievements in device conception and community developments. In particular, the activities at LARM2 in Rome are outlined on topics and systems through illustrative examples from the direct experience of the speaker by also including successful results from collaboration with the team of prof Takeda at Institute of Science Tokyo. Plans for future collaboration with student exchanges will be also discussed.

Keywords: Motion Assistance, Assisting Devices, Robotics and Mechatronics, Mechanism Design, Elderly People Welfare

Marco Ceccarelli, born in Rome in 1958, is Professor of Mechanics of Machines at the University of Rome Tor Vergata, Italy, where he chairs LARM2: Laboratory of Robot Mechatronics. His research interests cover subjects of robotics, biomedical engineering, mechanism design, experimental mechanics, and history of mechanical engineering with several published papers in the fields of Robotics and Mechanical Engineering. He has been visiting professor in several universities in the world. He is ASME fellow. Professor Ceccarelli serves in several Journal editorial boards and conference scientific committees. He is editor-in-chief of the MDPI journal Robotics and of the SAGE International Journal on Advanced Robotic Systems for the area on Service Robotics He is editor of the Springer book series on Mechanism and Machine Science (MMS) and on History of MMS. He has been the President of IFToMM, the International Federation for the Promotion of MMS in 2008-11 and 2016-19. He has started several IFToMM sponsored conferences including (HMM) Symposium on History of Machines and Mechanisms, MEDER (Mechanism Design for Robotics) and MUSME (Multibody Systems and Mechatronics). More information at the web page: LARM2 webpage: https://larm2.ing.uniroma2.it/marco-ceccarelli/