

Title: Towards achieving human-like robotic tasks via novel control methods

Abstract:

Current trends in robotic system development implement soft components at various levels (materials, sensing, actuation) in order to achieve a human-like performance. This new set of morphological characteristics although it provides a lot of functionality, increases the complexity of traditional control solutions that are based mainly on detailed modeling and kinematic planning, without necessarily assuring human-like motions. Furthermore designing controllers able to guarantee quality of performance is expected to impact significantly a range of robotic applications in the service and smart manufacturing sector. The talk will discuss the introduction of a novel control methodology called prescribed performance control (PPC) that has been used to resolve many of the recently posed challenges in various robotic applications. The PPC methodology allows the incorporation of time dependent inequality constraints in the control objective. It is not a constructive methodology but it has however significantly relaxed the control objective seeking only the boundedness of a measurable signal. Results on prescribed performance controllers for robotic control applications ranging from position and position/force control of non-redundant robots to human like reaching of redundant arms and position control of flexible link robots will be presented.