

Title:

From Gaits to Nonlinear Modes - the Role of Mechanical Dynamics in Legged Locomotion

Abstract:

In this talk, I want to shine light on the question of gait selection from the perspective of dynamics and mechanics. Why should a legged system use different gaits at different speeds, what constitutes these gaits, what causes their existence, and how do they relate to gaits observed in biology?

I want to highlight a potential relationship between passive mechanical oscillation modes that exist in highly simplified and energetically conservative models of legged systems and the gaits that we can observe in humans, animals, and in legged robots. I also want to discuss how these nonsmooth nonlinear normal modes can be used as a basis to develop energy optimal gaits for legged robotic systems.